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CAMERON (Thomas W. M.). **Observations on a Parasitological Tour of the Lesser Antilles.**—*Proc. Roy. Soc. Med.* 1929. May. Vol. 22. No. 7. pp. 933–941 (Sect. Trop. Dis. & Parasit. pp. 37–45).

An interesting sketch of the British islands of the Lesser Antilles—commentative and reflective rather than novel. We are reminded that malaria existed in Barbados up to the end of the eighteenth century and of the tardy and infirm recognition of its recent re-appearance there; of the early clinical descriptions of the formerly prevalent "Barbados leg," and of the gradual decrease of that locally-distinguished form of elephantiasis. The evidence that syphilis was brought to Europe from the West Indies is emphasized. The ubiquity of the yellow-fever mosquito, and the notoriety of the "bête rouge," jigger, and fer-de-lance are confirmed. A decrease of malaria in St. Kitts is attributed to anti-mosquito recommendations made by Dr. George Low in 1902. The presence of Bertiella in monkeys at St. Kitts is reported and a case of that infection in a girl in that island. In St. Kitts in certain tracts watered by permanent streams bilharziasis is not uncommon; here prophylaxis is complicated by the existence of the infection in the monkeys. Here, too, the author was able to infect the predominant freshwater snail, *Planorbis guadaloupensis*, experimentally. Commenting on the prevalence of hookworm in these islands, the author of course insists on the fact that cure is merely palliative without sure prevention of re-infection, that this again is not merely a matter of providing latrines unless the latrines are used; that this again "implies education, which in turn implies prosperity; for money and the correct spending of money is the crux of the whole question." [Implies education—Yes; but as Portia says, "If to do were as easy as to know what were good to do——; but this reasoning is not in the fashion."]

A. Alcock.

CLÉMENT. Contribution à l'étude de la parasitologie de la Guadeloupe. [**A Contribution to the Parasitology of Guadeloupe.**]—*Ann. de Méd. et de Pharm. Colon.* 1929. July–Aug.–Sept. Vol. 27. No. 3. p. 459.

From this bare list multiple infestations by intestinal parasites seem to be as common in Guadaloupe, among the native population,

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as they are elsewhere in the tropics. They were found in 605 of 764 stools examined, the species and their respective recurrences being as follows: *Necator americanus* 179 times, *Ascaris lumbricoides* 344, *Trichocephalus trichiuris* 365, *Schistosoma mansoni* 107, *Strongyloides stercoralis* 47, *Entamoeba dysenteriae* 57, *Balantidium coli* 4, and various Flagellates 50 times. Blood parasites found in 63 of 210 films examined were *Plasmodium vivax* 37 times, *P. praecox* 17, *P. malariae* 4, *Microfilaria Ozzardi* 6 times.

A. A.

Brumpt (E.). Splénectomie et infections parasitaires. [**Splenectomy and Parasitic Infections.**]—*Jl. Egyptian Med. Assoc.* 1929. Mar. Vol. 12. No. 3. [In Egyptian. French summary pp. 31–37.]

This is an interesting discourse on the progress during the last forty years or so of knowledge of the defensive powers of the spleen against parasitic infections. The author assigns to J. H. Rogers (1888) the first deliberate attempt to determine the effect of splenectomy upon the course of a specific infection; his experiments were made with anthrax, in rabbits, and from the discordant results it was concluded that the influence of the spleen was small. After Rogers a host of authors are mentioned who in various ways accumulated evidence of bactericidal and agglutinating properties possessed by the spleen, notwithstanding the notorious fact that in certain chronic parasitic infections (leishmaniasis, malaria, relapsing fever) that organ showed up as a shelter where the parasites lurked and made increase in the intervals between relapses. The author then reviews, seriatim, a multitude of purposive and accurate observations made by various well-known authorities on the effects of splenectomy upon a specific chronic infection—spirillum, leishmania, trypanosoma, plasmodium, haemogregarina, piroplasma and similar forms, and Bartonella (Grahamella)—all pointing with one accord to the defensive functions of the spleen. The paper is a valuable summary of recorded fact, dates, and authorities, but there is not a bibliography.

A. A.

Rao (H. Srinivasa). **The Aquatic and Amphibious Mollusca of the Northern Shan States, Burma.**—*Records Indian Museum.* 1928. Vol. 30. pp. 399–468. With 28 text figs. & 3 plates (1 map). [34 refs.]

In his survey of the aquatic and amphibious mollusca, which are well represented in the Northern Shan States, the author examined for fork-tail cercariae every species of freshwater mollusc that he collected. The result was negative; indeed, with the exception of two species (*Indoplanorbis exustus* and *Melanoides tuberculatus*) that harboured Xiphidio- and Amphistome cercariae, all the species in the area surveyed were free from Trematode parasites of any sort. Moreover, the genus *Oncomelania* was not represented. Enquiries at three local hospitals showed that no further cases of schistosomiasis had been recorded since Cullen's report in 1924 [see this *Bulletin*, Vol. 22, p. 471], although the immigration of Chinese coolies from Yunnan had not diminished within the last three years.

All these facts, as the author says, tell against any imminent risk of the introduction of schistosomiasis into Burma. "However, the discovery by SEWELL, in 1919, of a species of cercaria morphologically identical with the cercaria of *S. japonicum* in *Indoplanorbis exustus* from Calcutta and Wynaad in South India, and in *Limnaea acuminata* from Calcutta, leaves the question of the probable spread of schistosomiasis in India and Burma still open." Both these species were common in the ponds and pools surveyed in the present expedition.

A. A.

PIROT. Index parasitaire intestinal des matelots indigènes du recrutement indochinois, embarqués sur un bâtiment des forces navales en Extrême-Orient. [**Parasite-Index of Indochinese Lascars.**]—*Arch. Méd. et Pharm. Nav.* 1929. Jan.–Feb.–Mar. Vol. 119. No. 1. pp. 135–145. [1 ref.]

A report on faecal examination of 37 Indochinese lascars. Parasites were found in 36 of them, including 18 double, 8 triple, and 3 quadruple infestions. *Necator americanus* occurred in 27, Trichocephalus in 20, Ascaris in 18, *Strongyloides stercoralis* in 3, Oxyuris in 2, *Clonorchis sinensis* in 1, *Taenia saginata* in 1; Entamoeba of dysentery in 3, *E. coli* in 2, Endolimax in 1, *Chilomastix mesnili* in 1. The number of examinations was at least two in each case, but occasionally four or five, and at each individual examination two specimens were scrutinized.

A. A.

TISSEUIL (J.). Index du parasitisme intestinal à Nouméa. [**Intestinal Parasite Index at Noumea.**]—*Bull. Soc. Path. Exot.* 1929. May 8. Vol. 22. No. 5. pp. 334–336.

The intestinal parasite index at Noumea (New Caledonia) calculated from the evidence of 1,592 stools examined in the year 1928, of which 982 were positive, is 62·46 per cent., composed as follows: Spirilla, 2·95 per cent. positive; dysenteric amoeba, 26·49; *Entamoeba coli*, 8·75; Chilomastix, 0·81; Lamblia, 20·46; Trichomonas, 1·73; Blastocystis, 10·18; Ancylostoma, 30·14; "Anguillules," 7·63; Trichocephalus, 9·76; Ascaris, 4·17. A single species of parasite was present in 727 stools, two species in 206, three species in 44, and four species in 5.

A. A.

RILEY (William A.). **Protozoal Infestations of Ex-Service Men in Minnesota: Analysis of Two Hundred and Six Cases.***—*Jl. Amer. Med. Assoc.* 1929. May 18. Vol. 92. No. 20. pp. 1661–1662. [7 refs.] [Zool. Dept., Univ. of Minnesota.]

Of 500 hospital cases referred for specific investigation 162 revealed protozoa in the stools, including 35 cases of double, 7 of triple, and 3 of quadruple infection. The specific percentages for the whole 500 were for *Entamoeba histolytica* 1·4, for *E. coli* "approximately 14·0," *Endolimax nana* 11·2, *Giardia lamblia* 5·0. Trichomonas, Chilomastix, and two instances of *Dientamoeba fragilis* were observed also. All the

* This figure is misleading. It is the number of protozoal infections, not that of patients.

162 positive cases were from patients with gastro-intestinal, neurasthenic or other suspicious symptoms, and at least three examinations were made in each case.

A. A.

i. Zdrodowski (P.) & Voskressenski (B.). Sur la répartition et l'épidémiologie des infections intestinales par les protozoaires en Azerbaidjan. [**The Distribution and Epidemiology of Intestinal Protozoan Infestations in Azerbaijan.**]—*Arch. Inst. Microbiol. et Hyg. d'Azerbaidjan.* 1929. Vol. 1. No. 1–2. pp. 97–114. [14 refs.] [In Russian. French summary pp. 153–155.]

ii. Voskressenski (B.). Trois cas de la coccidiose humaine en Azerbaidjan. [**Three Cases of Coccidiosis in Man in Azerbaijan.**]—*Ibid.* pp. 115–120. With 1 text fig. [7 refs.] [In Russian. French summary p. 155.]

i. A survey of the carriers of intestinal protozoa among the natives of Azerbaijan. An " enriched " specimen from a single stool from 1,146 persons showed 852 infested with cysts, the infestation being single in 35·6 per cent., double in 34·5, triple in 19·6, quadruple in 9·2, quintuple in 1·0, and sixfold in 0·1. The species encountered were *Entamoeba coli*, in 53·0 per cent. ; *E. histolytica*, in 32·5 ; *Endolimax nana*, in 22·9 ; *Iodamoeba buetschlii*, in 22·9 ; Lamblia, in 14·0 ; *Chilomastix mesnili*, in 6·5, and in 3 cases *Isospora belli*. The high percentage of *E. histolytica*, equally in summer and in winter, accords well with the extensive epidemics of dysentery in summer and the prevalence of liver-abscess among the population.

ii. Appear to be the three cases listed above.

A. A.

Deschiens (R.). Chimisme gastrique et infections parasitaires du tube digestif. [**Gastrochymy and Intestinal Parasitic Infestations.**]—*Ann. Inst. Pasteur.* 1929. Oct. Vol. 43. No. 10. pp. 1353–1369. [6 refs.]

The author has tested by experiment the common belief that normal or excessive gastric acidity is deterrent to infestation by intestinal parasites, particularly protozoa, and his observations—so far as protozoa are concerned ; research on intestinal worms is in progress—contradict that belief.

On the one hand, he compared the gastric acidity of 42 enteropathic patients having evidence of infestation by intestinal parasites, with that of 50 such patients not presenting such evidence, with the following results :—

	The infested.	The not infested.
Those with deficient acidity	31 per cent.	34 per cent.
Those with normal acidity (0·17 per cent. HCl)	33 per cent.	26 per cent.
Those with excessive acidity ...	36 per cent.	40 per cent.

On the other hand, he tested the resistance to artificial digestion by gastric juice, both of normal acidity and of acidity increased up to 0·62 per cent., of cysts of *Entamoeba dysenteriae*, *E. coli*, and *Giardia*

intestinalis, and found that "two to three hours at a temperature of 37° C. did not destroy the vitality of at least 12·5 per cent. of the cysts of these protozoa." The technical details are to be found in the paper.

A. A.

HEGNER (Robert). **Transmission of Intestinal Protozoa from Man and other Animals to Parasite-Free Fowls.**—*Amer. Jl. Hyg.* 1929. May. Vol. 9. No. 3. pp. 529–543. [5 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The object of these experiments is not only to determine whether domestic fowls may be capable of transmitting human intestinal protozoa, but also to obtain light on the "host-specificity" question. Fowls were used because easily obtainable and maintainable free of infection, being enlisted as four- or five-day chicks. The protozoa used (21 species) were those commonly available. Most of the work was done with *Trichomonas muris*. In all 345 fowls were used.

"In all, 118 chicks were used in experiments with *Trichomonas muris*. Specimens were at least as active in the cecal contents of the chick as in the rat. Fowls 15, 16, and 37 days old were as susceptible to this trichomonad as 3 or 4 day chicks. Infections were maintained in certain fowls for 191 days and would probably have persisted for a longer period; these could hardly be considered temporary infections. What appeared at first to be individual differences in susceptibility were probably due to failure to gain entrance to the ceca or to some other mechanical factor. Variations in the numbers present in cecal material were observed from time to time; these were probably due to the fact that large numbers of trichomonads are evacuated with the cecal contents and a correspondingly long period is necessary for multiplication. Parasite-free chicks became infected when confined in the same cage with infected birds. Heavy infections with *T. muris* were obtained in chicks when fed on a steak or liver diet, whereas in rats this organism rapidly decreases in numbers when the hosts are fed on a steak diet (Hegner, 1923; Ratcliffe, 1928).

"Six other species of *Trichomonas* were inoculated into chicks as indicated in the table (page 533)."

"Cysts of *Chilomastix mesnili* from man gained entrance to the ceca of chicks when inoculated per os and per rectum but failed to excyst. Infections were obtained with trophozoites of both this species and with *C. bettencourti* from rats but these were followed for only a few days.

"Cysts of *Giardia lamblia* from man and *G. muris* from rats excysted in the intestine within from 45 minutes to 1½ hours after inoculation per os, but whether or not these would live in the ceca was not determined.

"Balantidia from pigs and guineapigs when inoculated per os or per rectum were found alive in the ceca for from 2 hours to 48 hours after the operation. Their numbers were small and multiplication probably did not take place.

"Only 2 of 17 chicks inoculated with the dysentery amoeba of man, *Endamoeba histolytica*, became infected; these were inoculated per rectum with material from an infected kitten and remained infected for 2 days.

"Cysts of *Endamoeba coli* and *Iodamoeba williamsi* from man did not excyst in chicks.

"One cyst of *Endolimax nana* from man excysted in a chick and one containing a moving amoeba was observed.

"Trophozoites of *Endamoeba muris* from rats and of *E. cobayae* from guineapigs were recovered from the cecal material of chicks from 20 hours to 5 days after inoculation per os or per rectum.

"These cross-infection experiments demonstrate that fowls, especially young chicks, are very susceptible to certain intestinal protozoa of man

and other animals. Further work needs to be carried on with amoebae, *Chilomastix* and *Giardia*, but the evidence with respect to *Trichomonas hominis* and *T. buccalis* from man and trichomonads from other animals is very convincing. The results indicate that chicks may become infected by ingesting these organisms and may remain infected, and deposit flagellates in their feces for at least several months. Where sanitary conditions are inadequate fowls may thus become important transmitting agents of human intestinal trichomonads. The preliminary data regarding other flagellates and amoebae indicate that these may likewise be transmitted to a certain extent by fowls.

" These experiments also concern the problem of host-parasite specificity. This is especially true of the trichomonads. These flagellates are usually considered to represent distinct species in different hosts although morphological differences are exceedingly difficult to distinguish. The data obtained from these cross-infection experiments suggest that the trichomonads of fowls, rats, pigs, guineapigs, monkeys and man may actually belong to one species. The careful study of material from various hosts before and after inoculation into chicks should help solve this problem. Work of this type is now in progress."

A. A.

DA CUNHA (Aristides Marques) & MUNIZ (Julio). [In Portuguese & German.] Nota sobre os parasitas intestinaes do *Macacus rhesus* com a descripção de uma nova especie de *Octomitus*. Bemerkungen über Darm-Parasiten des *Macacus rhesus* mit Beschreibung einer neuen Art von *Octomitus*. [**Intestinal Parasites of** *Macacus rhesus*.]—*Inst. Oswaldo Cruz, Supplemento das Memorias*. 1929. Jan. & Feb. No. 5. In Portuguese pp. 34–35. With 1 plate. In German pp. 36–37.

The Rhesus monkeys imported for study of yellow fever often suffer from enteritis, and in their evacuations several species of intestinal protozoa very like those occurring in man are found. Exceptional is the *Octomitus pitheci*, a new species now described and figured. Of the others, an Entamoeba is very like *E. coli*, a Chilomastix seems identical with *C. mesnili*, and a Balantidium is identical with *B. coli* (and distinct from the *B. aragaoi* found in the S. American monkey *Cebus caraya*). There are also two forms of Trichomonas—of which one is akin to *T. hominis*, and the other, and larger, is somewhat different both from *T. hominis* and from the *T. macacovaginae* described by HEGNER.

A. A.

CHODOUKINE (N. I.). Les protozoaires de l'intestin des puces de chien à Taschkent. [**The Intestinal Protozoa of Dog-Fleas in Tashkent.**] —*Pensée Méd. d' Usbékistane*. Tashkent. 1927. Dec. No. 3. pp. 69–73. [8 refs.] [In Russian. French summary p. 136.]

The author records the examination of 562 fleas from healthy dogs and 230 from dogs suffering from canine leishmaniasis. The fleas comprised *Ctenocephalus canis*, *C. felis* and *Pulex irritans*. The percentages infected with leptomonas in the two groups were 14·5 and 13·04. In addition to the leptomonas 35–40 per cent. of the fleas showed *Nosema pulicis*, 4 per cent. *Crithidia pulicis*, 0·1 per cent. *Legerella parva*. Of larval fleas examined 3·07 per cent. harboured *Leptomonas ctenocephali*, 0·27 per cent. *Crithidia pulicis*, 2·23 per cent. *Nosema pulicis*, and 100 per cent. what is possibly *Actinocephalus parvus*.

C. M. W.

Hinshaw (H. Corwin). **Correlation of Protozoan Infections of Human Mouth with Extent of Certain Lesions in Pyorrhea Alveolaris.**—*Proc. Soc. Experim. Biol. & Med.* 1926. Vol. 24. pp. 71–73.

From cultivation in Boeck's medium of material from the gums of 280 individuals the author observes that protozoan parasites do not occur in the normal mouth. *Entamoeba gingivalis* occurs in most (or all) cases of early pyorrhoea, and *Trichomonas buccalis* frequently in cases of advanced pyorrhoea and occasionally after effectively treated cases. *T. buccalis* "is definitely antagonistic to *E. gingivalis* in vitro."

A. A.

Ratcliffe (Herbert L.). **The Relations of *Endamoeba muris* and *Chilomastix bettencourti* to the Diet and Intestinal Conditions of Rats.**—*Jl. Parasit.* 1929. Dec. Vol. 16. No. 2. pp. 75–80. [4 refs.]

The object of this study was to determine (for certain comparative reference) the reactions of *Entamoeba muris* and *Chilomastix bettencourti* to specific changes in the diet of their rat hosts. A list of the different experimental diets is given. Observations at 25-day intervals showed that infestations with both species were light when the rats were on a diet that encourages the predominance of aciduric bacteria. On a diet that promotes the growth of Gram-negative bacteria both species increased in numbers. A diet that increases the proteolytic anaerobes and decreases both the Gram-negative and Gram-positive aerobes caused a decrease of both species of Protozoa.

A. A.

Hegner (Robert) & Schumaker (Eugene). **Some Intestinal Amoebae and Flagellates from the Chimpanzee, Three-Toed Sloth, Sheep and Guinea-Pig.**—*Jl. Parasit.* 1928. Sept. Vol. 15. pp. 31–37. With 11 text figs. [2 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

The authors survey the various *histolytica*-like and *coli*-like amoebae that have been found by divers observers in various species of Primates, and they figure cysts of two such amoebae and also an *Iodamoeba williamsi*-like cyst found by them in a defunct chimpanzee captive. They appear to incline to the opinion that, irrespective of a multitude of different names, the several forms included in this triad are identical with the corresponding forms in man. They also describe and figure as new species an Entamoeba, a Giardia, and an Embadomonas from the three-toed sloth, and an Embadomonas from the guineapig and another from the sheep. [The species from the sloth are all named "bradypi." May we plead that "bradypodus," the correct inflexion, has a more finished look ?]

A. A.

Mayne (Bruce). **The Nature of the 'Black Spores' associated with the Malaria Parasite in the Mosquito and their Relationship to the Tracheal System.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 109–134. With 18 figs. on 4 plates. [35 refs.]

This is a full and critical account of the history of the "black spores" from beginning to end. From his own observations the author agrees that they are chitinous, and further concludes that they

are merely thickenings of the tracheal tubules (which, as is well known, are lined with chitin). Furthermore, from the fact that he found them as often in mosquitoes fed on sparrows *not* infected with malaria parasites as in mosquitoes fed on infected sparrows, and also in male and female mosquitoes that had not been fed at all, as well as in house-flies, he justly concludes that they cannot have any specific connexion with malaria.

A. A.

BRUG (S. L.). **Observations on a Culture of** *Entamoeba histolytica.*—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1928. Vol. 17. Pt. 2. pp. 225–233. With 2 text figs., 1 diagram & 33 figs. on 2 plates. [8 refs.] [Med. Lab., Weltevreden.]

The author disclaims intention to give a full report of his experience with entamoebic cultures; rather he records some observations which are in contradiction (so he states) with those observed by other authors, or which have found little or no consideration in the literature.

His findings are well illustrated by figures; they are interesting, but of purely protozoological interest, and as they must be set out in careful and rather minute description they cannot be justly subjected to summary. Some of his observations may be mentioned. Using silver and copper preparations in various ways he failed to rid *E. histolytica* culture of bacterial contamination. Seven attempts to cultivate *E. coli* failed; and with *E. histolytica* most attempts failed due, he suggests, to the peculiar intestinal flora of the E. Indies.

His observations do not support the view that encystation of *E. histolytica* is induced by unfavourable conditions, but rather the contrary; and he cites in support clinical observations on the regaining of cyst producing capacity of the parasites after emetine therapy. "Only thoroughly sound amoebae can produce cysts—invalids cannot." He has not been able to trace anything in cultures suggesting mitosis or chromosomes; nuclear division of *E. histolytica* was amitotic. Phagocytosis, even cannibalism, of *E. histolytica*, was noted, and a careful description is given of the process of "drinking," or phagocytosis of fluid by the amoeba. Certain "black bodies" probably extruded by the nucleus were noted.

H. M. Hanschell.

SCHACHSUWARLY (M.). Ueber die Beeinflussung von *Entamoeba histolytica* in der Kultur durch die Konzentration des Mediums und durch Bakteriophagen. [**Influence of Concentration of Medium and of Bacteriophage on** *E. histolytica* **in Culture.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Mar. Vol. 33. No. 3. pp. 129–134. [Inst. for Ship & Trop. Diseases, Hamburg.]

The experimental work is fully set out and results tabulated. On the data thus obtained the author's conclusions are :—

Abrupt raising and lowering of the NaCl content in the culture medium prevents encystment of *E. histolytica*. The lower limit for multiplication of *E. histolytica* is 0·05 per cent., the upper limit 1·5 per cent., NaCl content in fluid medium. High salt concentration brings about a viscid consistency of the endoplasm. Addition of bacteriophage (Shiga-Kruse, Flexner,

Y, and *Bacterium coli*) prevents encystment of *E. histolytica*. Shiga-Kruse bacteriophage inhibits multiplication of *E. histolytica* in culture; while Flexner, Y-, and *Bact. coli* lysates do not.

H. M. H.

Gridnewa (W. M.). [Einflus[s] der Salzkoncentrationen auf das Wachstum und Morphologie der Amöben in den Kulturen.] [**Influence of Salt Concentration on Growth and Morphology of Amoebae in Cultures.**]—*Nachrichten d. Tropischen Medizin.* Tiflis. 1929. Jan. Vol. 2. No. 1. [In Georgian script. German summary pp. 70–71.]

Increasing the salt concentration of the culture medium brings about alteration in the morphology of the amoeba; so much so that an amoeba may assume then features which are characteristic for other species. The gradual decrease in size of the pulsatile vacuole indicates that the absence of this vacuole in parasitic or saprophytic amoebae is not a specific character of parasitic amoebae but rather one dependent on the salt concentration of the medium.

H. M. H.

Deschiens (R.). Recherches sur la culture d'*Entamoeba dysenteriae* (pH, évolution chimique, simplification). [**On the Cultivation of** *Entamoeba dysenteriae*.]—*C.R. Soc. Biol.* 1929. June 28. Vol. 101. No. 22. pp. 665–667. [1 ref.]

The author here discusses in condensed detail his experiences in the process of cultivation of *Entamoeba histolytica* in a simplification of an improvement (introduced by Dobell and others named) of the Boeck and Drbolav medium proposed by himself in *C.R. Soc. Biol.*, 1927, Vol. 96, pp. 1,356.

A. A.

Freeman (L. B.). **Studies on Amoebae from Human Hosts.**—*Jl. Parasit.* 1929. Sept. Vol. 16. No. 1. pp. 1–12. With 13 figs. on 1 plate. [9 refs.] [Zool. Dept., Univ. of Pennsylvania, Philadelphia.]

The following is a summary by the author himself, who makes no reference to Dobell's recent paper (*Bulletin*, Vol. 26, pp. 795–6) and appears to be unacquainted with the phenomena of excystation therein described for *Entamoeba histolytica*.

"1. The presence in the human intestine of an amoeba corresponding in essentially all morphological details to the description of *Councilmania lafleuri* (Kofoid and Swezy, 1921) has been confirmed.

"2. The pathogenic properties of this amoeba were not completely demonstrated although there was evidence that it may be pathogenic.

"3. Amoeba were recovered from the ceca of rats to which cysts from human feces had been fed, but it could not be established that these amoebae were the same species as those fed.

"4. The phenomenon of 'budding' in the encysted forms of this amoeba as seen in prepared slides is not a biological process, but is due to the strength, temperature and type of fixing agent employed in the preparation of the material, and to the race and condition of the cysts.

"5. Since the validity of the genus Councilmania depends primarily upon the biological significance of 'budding' it is suggested that the correct name for this amoeba is *Endamoeba lafleuri*, assuming, for the moment, that the name Endamoeba is available for these amoebae from human hosts."

A. A.

ANDREWS (Mary Neville). **Observations on *Trichomonas vaginalis* Donné, 1837 ; with Particular Reference to its Incidence in England and its Cultivation.**—*Jl. Trop. Med. & Hyg.* 1929. Sept. 2. Vol. 32. No. 17. pp. 237–240. With 5 figs. [14 refs.] [School of Hyg. & Trop. Med., London.]

The author quotes statistics from several countries in Europe and America illustrating the fairly common occurrence of *Trichomonas vaginalis* in vaginal secretion, especially in Russia. She also discusses at length the technique of cultivating the creature, the medium finally recommended being a 2 per cent. agar slope covered with serum-saline-citrate lotion pH 7·6, since in it bacteria are stayed and subinoculations at weekly intervals are sufficient.

In all, 100 women were examined (12 gynaecological, 18 antenatal, and 70 venereal) from the neighbouring Royal Free Hospital, and the Trichomonas was found in 20 of them—in 5 instances only by culture. Of these 20 positives 13 were supplied from 28 cases of gonorrhoea, 4 from 8 cases of *Bact. coli* vaginitis, 2 from the antenatal patients, and 1 from 34 chronics. Of 3 children also examined (2 gonorrhoeas and 1 pruritus vulvae) all were free of the flagellate. On the whole, no evidence was obtained that the Trichomonas was pathogenous.

In the vaginal secretion *T. vaginalis* is larger than *T. hominis*, there are four anterior flagella, and the undulating membrane does not run the whole length of the body. In culture it is smaller, the undulating membrane extends beyond the body as a free flagellum, and it becomes morphologically indistinguishable from *T. hominis*.

A. A.

HEGNER (Robert). **The Viability of Trichomonad Flagellates in Milk.**—*Jl. Parasit.* 1929. Sept. Vol. 16. No. 1. pp. 47–48. [1 ref.] [Johns Hopkins School of Hyg. & Public Health, Baltimore.]

The author refers to his experiments demonstrating the ability of *Trichomonas hominis* to survive transmission through the housefly and its inability to survive in water. He now summarizes experiments showing that it can survive, even up to 48 hours, in milk.

"Human intestinal trichomonads of the type with five anterior flagella (Pentatrichomonas) were grown in culture and various quantities of the culture medium added to pasteurized milk. The following mixtures were set up and maintained at room temperature : (1) 10 cc. of culture to 40 cc. of milk, (2) 5 cc. of culture to 45 cc. of milk, (3) 3 cc. of culture to 47 cc. of milk, and (4) 1 cc. of culture to 49 cc. of milk. These mixtures were examined at frequent intervals during a period of eight hours and active, apparently normal, trichomonads were recovered from all of them at every examination. At the end of 24 hours apparently normal specimens were recovered from the mixture of 10 cc. of culture material to 40 cc. of milk and this mixture remained positive for the succeeding 24 hours. No trichomonads, however, were found in the other three dilutions at the end of 24 hours, probably because they were present in such small numbers that they could be recovered only with great difficulty. These experiments supplement the work previously reported and render practically certain the transmission of human intestinal flagellates by flies and unsanitary conditions to human beings as a result of the contamination of milk and probably through types of food and drink."

A. A.

Visher (John W.). **Vesical Infection with** *Trichomonas vaginalis.*—*Jl. Amer. Med. Assoc.* 1929. June 22. Vol. 92. No. 25. pp. 2098–2099. [14 refs.]

A case in a woman of 32 years admitted to hospital with fever and symptoms of cystitis and acute pyelitis. The bladder contained a few pus-cells and a multitude of living flagellates identified as *Trichomonas vaginalis*.

A. A.

Deschiens (R.) & Kipchidzé (N.). Trichomonas de la bouche des singes. [**A Trichomonas in the Mouth of Monkeys.**]—*C.R. Soc. Biol.* 1929. Nov. 15. Vol. 102. No. 30. pp. 518–520.

The Trichomonas, which is considered to be identical with *T. elongata* found in the human mouth, was observed in the mouth of *Papio sphinx* and *Macacus rhesus*, in the former species associated with an Entamoeba of the *gingivalis* type.

A. A.

Gabaldón (Arnoldo). Nota sobre el desarrollo "in vitro" de "Chilomastix mesnili." [**Cultivation of** *Chilomastix mesnili in vitro.*]—*Gac. Méd. de Caracas.* 1929. (25° Aniv. Acad. Nac. de Med. Numero extraord.) pp. 79–82. With 2 text figs. [8 refs.]

The author has cultivated *Chilomastix mesnili* in media with faeces from the caecum of rats and guineapigs as a base and also in Schourenkowa and Lissovsky's medium. He had good results with both, and in the former has made 39 subcultures in 5 months. The optimum reaction of the medium lies between pH 6·8 and 7·2, but sudden transfer from one extreme to the other retards reproduction for a few days. When transferred to room-temperature they take a form which he regards as the precystic stage, the cytoplasm free of bacteria, and a swelling posteriorly, while the flagella shrink and become sluggish.

H. Harold Scott.

Scheidel (Herbert) Ueber die Pathogenität von *Lamblia intestinalis.* [**Pathogenicity of** *L. intestinalis.*]—*Med. Klin.* 1929. Dec. 27. Vol. 25. No. 52 (1307). pp. 2001–2003. [14 refs.] [Med. Clinic, Univ., Heidelberg.]

In discussing whether or not Lamblia is to be regarded as pathogenous Dr. Scheidel takes no notice of authors outside the German record and therefore writes as if the question had not been answered in something like a final affirmative by the rest of the world. He gives, however, concise and suggestive abstracts of four cases, all pointing to the hepatic region, where appropriate tubage discovered a multitude of living Lamblias in the duodenal juice or in the bile reflux. In one case having sanguineous and slimy diarrhoea concurrent the flagellates seemed to be the exclusive cause. He therefore decides that it is "quite possible and probable" that a heavy infestation by Lamblia has a pathogenous significance, although further observations on this question are necessary; at any rate, that by reducing the number of the Lamblias an abatement of the patient's complaints can be effected.

A. A.

Labbé (Marcel), Nepveux (Fl.) & Justin-Besançon (L.). Cirrhose hypertrophique pigmentaire du foie et lambliase intestinale. [**Intestinal Lambliasis and Hypertrophic Cirrhosis of the Liver.**] —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1929. July 15. 3rd Ser. Vol. 45. No. 24. pp. 1007–1011.

Although the authors are convinced that lamblia infestation is often a mere sequence of enteritis, they present here a case where, in their opinion, a state of chronic hepatitis and haemorrhagic duodenitis must be attributed to a prodigious infestation by that parasite.

The authors conclude that all these pathological changes, as well as the chronic enteritis, were caused by the heavy Lamblia infestation—a conclusion fortified in their opinion by the fact that one of them in the course of his experience had observed several cases—two of which are briefly abstracted—of great enlargement of the liver concomitant with the existence of Lamblia in the duodenal bile and the gall-bladder.

A. A.

Umidowa (S. I.) & Schwarz (A. L.). [Ein Subdiaphragmatischer Abscess mit *Lamblia intestinalis*.] [**Subdiaphragmatic Abscess associated with** *Lamblia intestinalis*.]—*Pensée Méd. d' Usbékistane.* Tashkent. 1927. Dec. No. 3. pp. 110–112. [4 refs.] [In Russian. German summary p. 139.]

This case began as an intense bellyache, passage of green liquid stools free from blood or slime, and fever. In the course of 24 days all symptoms abated, except fever. Under hospital observation now, the discovery of dulness below the right scapula suggested exploratory puncture, which eventually tapped stinking pus full of living lamblias, the patient still with fluctuating fever and passing one or two pulpy stools daily. An operation revealed a deep abscess, big as a hen's egg, beneath the diaphragm.

A. A.

Mallia (Guglielmo Rosa). Contributo diagnostico e terapeutico alla lambliasi intestinale (con due casi osservati in Sicilia, nel Ragusano). [**Diagnosis and Treatment of Lambliasis.**]—*Riforma Med.* 1929. Sept. 14. Vol. 45. No. 37. pp. 1258–1260. [8 refs.]

Reports in great detail of two patients who had suffered on and off for some years with attacks of diarrhoea resulting in anaemia and debility. Lamblia were found in the stools. The first soon recovered when given stovarsol, the second after injection of arsenobenzol, stovarsol not proving very effective.

H. Harold Scott.

Teitge (H.). Die Lambliosis bei den Bergarbeitern des Ruhrgebiets als Ursache von Magenbeschwerden. [**Lambliasis as a Cause of Gastro-intestinal Disorder in Ruhr Miners.**]—*Klin. Woch.* 1929. June 18. Vol. 8. No. 25. pp. 1175–1176. [19 refs.]

Of the 200 patients in a Ruhr mines infirmary [unspecified] in the Ruhr, 110 were suffering from gastro-intestinal disorders, 23 of the sufferers being found infected with Lamblia. In 3 cases the parasite was found in the gall-bladder. Neosalvarsan injections (0·3 gm.) with purgation (Mag. Sulph.) and sulphur (6–9 gm.) per os was the treatment instituted.

A. A.

Sautet (Jacques). Formation des kystes bleus de *Giardia intestinalis*. [**Formation of the Blue Cysts of** *Giardia intestinalis*.]—*Ann. Parasit. Humaine et Comparée*. 1929. May 1. Vol. 7. No. 3. pp. 193–195. With 1 text fig. [4 refs.] [Parasit. Lab., Faculty of Med., Paris.]

The author has observed various stages in the history of blue cysts of *Giardia intestinalis*. They gradually become smaller, their contents become granulous and their nuclei and flagella disappear, and finally they burst and discharge the mortal remains of the parasite.

A. A.

Schourenkova (A. I.) & Demina (N. A.). Sur les relations entre l'*Enteromonas* da Fonseca 1915 et le *Tricercomonas intestinalis* Wenyon et O'Connor 1917. [**On the Relation of Enteromonas of Fonseca 1915 and** *Tricercomonas intestinalis* **Wenyon and O'Connor 1917.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 645–651. With 1 text fig. [1 ref.] [Trop. Inst., Moscow.]

In the faeces of a man from Daghestan (Caucasia) who had suffered for three years from diarrhoea alternating with constipation, the authors found living flagellates identical with Fonseca's *Enteromonas hominis* and, after purgation, cysts identical with Wenyon's *Tricercomonas intestinalis*. In culture the flagellates were identical with Wenyon's form. The authors naturally agree with Dobell that Fonseca's names for genus and species (1915) hold the field.

A. A.

Robertson (Muriel). **The Action of Acriflavine upon** *Bodo caudatus*. **A Study of Heritable Modification in a Non-Conjugating Protozoan and its Relation to Certain Aspects of Chemotherapy in Trypanosomiasis.**—*Parasitology*. 1929. Nov. Vol. 21. No. 4. pp. 375–416. With 23 graphs & 3 text figs. [4 pages of refs.]

This fine study of the action of acriflavine upon *Bodo caudatus* is stated to have been to some extent suggested by Werbitzki's discovery that under the influence of certain dyestuffs a definite modification of structure—the suppression of the parabasal body—could be induced in trypanosomes. The author, as is here fully expounded, did succeed in producing, through the influence of acriflavine, individual Bodos without the parabasal body, but not a strain permanently so modified, although she has not relinquished hope. Furthermore, she has isolated from the stock derived from a single Bodo, clones (each of them being a group of lineal descendants of a single Bodo) showing *inter se* different degrees of natural resistance to the drug, and among them clones which having once acquired a high resistance have retained it through prolonged cultivation (up to a year) in media free of the drug. "Evidence that drug-fastness . . . is due to the interaction of selective inheritance and the actual modification of the quality of the *Bodo* by evolution in the drug is given. The modification is not apparently a mutation, it is a heritable piling up of changes in a particular direction." "*Bodo caudatus* being an organism without conjugation and therefore without bi-parental inheritance and consequently lacking the reorganizing effect that such a periodic closing of the cycle produces, affords an example of a labile organism capable of being progressively altered within certain limits under the influence of the environment."

[The author's experiments suggest something more than this (since the Bodos must absorb the drug) when it is remembered that DARWIN in *The Origin of Species* gave some reasonable justification for the belief that chemical changes in the sap of an organism might be a *cause* of modification in structure.]

In addition to its fundamental biological interest the bearing of the facts on certain aspects of trypanosomiasis and chemotherapy—a matter outside the purview of this section—is discussed.

A. A.

GWÉLÉSSIANY (J.). Recherches sur le passage du *Trypanosoma lewisi* à travers les muqueuses et sur son rôle pathogène. [**Observations on the Penetration of the Mucosa by *Trypanosoma lewisi* and its Pathogenous Significance.**]—*C.R. Soc. Biol.* 1929. May 31. Vol. 101. No. 18. pp. 281–283. [2 refs.] [Pasteur Inst., Paris.]

The author, using rats previously protected from risk of injury to skin and mucosa, and experimenting with citrated *Trypanosoma lewisi*-infected blood, conducted the following experiments. (1) Infected blood was carefully placed on the conjunctiva of 3 rats, and on the buccal mucosa of 3 others, and, for control, into the peritoneum of another, and in due course trypanosomes were found in the blood of one of the first 3, and in 2 of the second three, and in the control; as those that died after infection were found to have coccidiosis no conclusions can be drawn as to cause of death. Therefore (2) Infected blood was placed on the conjunctiva of 5 rats, on the buccal mucosa of 5 others, and into 1 control rat; and of these, 4 became infected through the conjunctiva, 3 became infected through the buccal mucosa, as well as the control. Three of those infected through conjunctiva, and all those infected through mucosa, as well as the control, died.

The author therefore concludes that *Trypanosoma lewisi* can travel through an intact mucosa and is pathogenous to rats.

A. A.

BRUYNOGHE (R.) & VASSILIADIS (P.). La splénectomie dans l'infection du *Tr. Lewisi*. [**Splenectomy in *Trypanosoma lewisi* Infection.**]—*Ann. Soc. Belge de Méd. Trop.* 1929. June 30. Vol. 9. No. 2. pp. 191–195. [10 refs.] [Bact. Inst., Louvain.]

The author has studied the effect of splenectomy on the normal resistance of certain animals (in this case certain species of mice) to *Trypanosoma lewisi*. He found that in white mice, "wild" mice, and field-mice this resistance was not affected by splenectomy; but of 13 desplenated harvest-mice (*Mus minutus*) 5 became infected and showed numerous trypanosomes in their blood for several weeks. Some of them (3) died and some survived. In all but one of them there were concurrent changes in the blood (degenerations of the red cells and leucocytosis in 3 cases). The author, however, attributes the mortality to the infection with *T. lewisi*, since the one whose blood remained unaltered was one of the three that died.

A. A.

REGENDANZ (Paul). **Pathogenicity of *Trypanosoma lewisi* and Blood Sugar in Infections with *Trypanosoma lewisi* and *Bartonella muris ratti*.—*Ann. Trop. Med. & Parasit.* 1929. Dec. 31. Vol. 23. No. 4. pp. 523–526. [10 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

In rats dying of Bartonella infection there is a final hypoglycaemia. *Trypanosoma lewisi* is sometimes pathogenous to rats, where there is a final hypoglycaemia. The author has observed a strong infection of Bartonella in spleen-entire rats as the result of a *T. lewisi* infection; but since Bartonella can be eliminated by neosalvarsan and other organic arsenicals that have no effect upon *T. lewisi* (which is susceptible only to arsenophenylglycin, so far as is known at present) no confusion need occur in experimental studies.

A. A.

LINTON (Richard W.). **Blood Sugar in Infections with *Trypanosoma lewisi*.—*Ann. Trop. Med. & Parasit.* 1929. June 27. Vol. 23. No. 2. pp. 307–313. [13 refs.] [College of Physicians & Surgeons, Columbia Univ., New York.]

The author briefly reviews what has been written on the proposition that the pathological results of a trypanosome infection are to be attributed not to the direct action of the parasites but indirectly to their effect in decreasing the blood-sugar of their host. His own experiments, pursued in normal rats, trypanosome-infected rats, and trypanosome-infected rats that were desplenated in an attempt to increase the gravity of their infection, show that the blood-sugar of rats is not—beyond the normal range of variation—affected by infections with *Trypanosoma lewisi*; but that a hypoglycaemia is developed during the terminal stage of infection with *Bartonella muris*.

A. A.

REGENDANZ (P.). Die multiple Teilung des *Trypanosoma criceti*, seine Entwicklung im Hundefloh und Übertragungsversuche auf den Hamster. [*Trypanosoma criceti*: **Fission, Development in the Dogflea and Transmission to the Hamster.**]—*Ztschr. f. Parasitenk.* 1929. June 17. Vol. 2. No. 1. pp. 44–54. With 4 text figs. & 20 coloured figs. on 1 double plate. [14 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The life cycle of *Trypanosoma criceti* as followed in these experiments from hamster (*Cricetus frumentarius*) to hamster through the dog flea (*Ctenocephalus canis*) is in general similar to that of *T. lewisi* as described by MINCHIN and J. D. THOMSON. From 7 to 11 days (on one occasion not until 21 days) after feeding on infected hamsters the fleas' faeces became infective, and from 9 to 12 days after a saline emulsion of the infected faeces was brushed on the tongue of young hamsters trypanosomes usually became apparent in the hamsters' blood. In the infected flea the trypanosomes at first were found attached to the fore end of the stomach just behind the proventriculus, and afterwards in the cloaca (end-darm). Intra-cellular forms were not seen.

The author describes and figures the grown form of *T. criceti* from the blood of the hamster in comparison with *T. lewisi*, *T. microti*, and *T. primatium*; and its multiple fission up to a final octuple stage, in

comparison with *T. primatium*, as well as the forms assumed by *T. criceti* in the dung of the flea—forms very similar to corresponding forms of *T. lewisi*.

The duration of the infection in the flea has not yet been determined; in the hamster many months. Attempts to infect rats and guineapigs by means of infective flea-dung were unsuccessful; nor did the rats that served as nurse to infected fleas become infected.

A. A.

Zozaya (Carlos). Ueber das Trypanosoma des Hamsters (*Cricetus frumentarius*). [**On the Trypanosome of the Hamster** (*Cricetus frumentarius*).]—*Cent. f. Bakt.* I. Abt. Orig. 1929. Vol. 110. No. 4/5. pp. 187–190. With 1 coloured plate. [9 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Once more the trypanosome (*T. criceti*) of the hamster is differentiated structurally from *T. lewisi*. Chemically it is here said to resemble *T. lewisi* in being indifferent to Bayer 205, neosalvarsan, and antimony, but not to arsphenylglycin. Attempts to infect desplenated rats with *T. criceti* were not successful. Among the developmental forms of *T. criceti* in the flea intracellular forms were not observed. (It was observed that the hamster stood splenectomy well but did not develop Bartonella-anaemia.)

A. A.

Hoare (Cecil A.). **Studies on *Trypanosoma grayi*. 2. Experimental Transmission to the Crocodile.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. June 25. Vol. 23. No. 1. pp. 39–56. With 8 figs. on 4 plates. [25 refs.] [Human Trypanosomiasis Inst., Entebbe, Uganda.]

After a critical review of the history of *Trypanosoma grayi*—its discovery in the gut of *Glossina palpalis* and its consequent confusion with developmental stages of *T. gambiense*, and its later suspected connexion with the crocodile and monitor—the author describes in full and clear detail how, using flies (*G. palpalis*) and young crocodiles bred in the laboratory, he carried *T. grayi* through its entire life-cycle, from the guts of naturally-infected wild flies to young crocodiles and from young crocodiles thus infected to clean flies, and thus was able to prove its identity with the crocodile trypanosome, *T. kochi*. In the fly, as was known, the trypanosomes are found only in the midgut and hindgut, and the author shows that it is the forms in the hindgut—among which stumpy crithidia occur—that alone are infective to the crocodile. Infection of the crocodile takes place through the mouth, and the incubation period is 4 days. The local monitors do not harbour trypanosomes and all attempts to infect them with *T. grayi* failed.

A. A.

Macfie (J. W. S.) & Thomson (J. G.). **A Trypanosome of the Canary (*Serinus canarius* Koch).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 185–191. With 3 text figs. & 7 figs. on 1 plate. [4 refs.] [School of Hyg. & Trop. Med., London.]

An account is given of trypanosomes found in canaries used in chemotherapy experiments. The parasite was studied in the blood of about twenty canaries. As a rule, they were very scanty, but

occasionally they were more abundant, although the degree of infection was never heavy. The appearance of the parasites in the blood was irregular. As a rule, infection was benign, but the more heavily infected birds were ill; whether this was the effect of the abundance of trypanosomes is a matter of doubt. Smears of the organs did not show any concentration of the parasites, and no stages or forms were found in these situations differing from those present in the peripheral blood. The trypanosomes were sluggish, exhibiting little translatory movement. Their appearance in stained preparations is described.

It was observed that the canaries were always more or less infested with mites of the species *Dermanyssus gallinae*, and that a considerable proportion of the mites were infected with flagellates. The various forms of parasites discovered in the mites are described. The occurrence of a trypanosome in the blood of canaries, and its association with developmental forms of a trypanosome in the body cavity of the mite which feeds on these birds, strongly suggests, without complete experimental evidence, that the mite acts as the transmitting agent. Until, however, the difficulty of obtaining absolutely clean canaries free from mites from the date of hatching, and mites which had never fed on birds, has been overcome, conclusive proof of the relationship of the trypanosome in the mite and canary is lacking. As the life history of the trypanosome in the mite is confined to the body cavity, the method of transmission must be by crushing of the vector and liberation of metacyclic trypanosomes. There is no evidence that the intestinal excreta or the salivary glands of the mite contained trypanosomes.

W. Yorke.

Levaditi (C.) in collaboration with Sanchis-Bayarri (V.), Lépine (P.) & Schoen (R.). Etude sur l'encéphalo-myélite provoquée par le *Toxoplasma cuniculi*. [**Study of the Encephalomyelitis induced by** *Toxoplasma cuniculi*.]—*Ann. Inst. Pasteur.* 1929. June. Vol. 43. No. 6. pp. 673–735. With 48 text figs. & 7 coloured figs. on 1 double plate. [28 refs.]

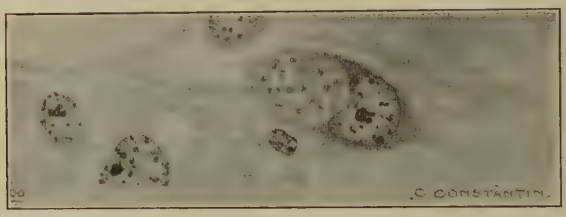
The authors refer to papers (see this *Bulletin*, Vol. 25, pp. 719, 720) by Torres, of Rio Janeiro, describing, by the name of *Encephalitozoon chagasi*, a new intracellular parasite infesting the brain and other tissues of a new-born infant suffering from congenital cerebro-spinal meningitis; by Levaditi, on an analogous case, reported by Janku of Prague, of parasitic sporocysts found in the choroid and retina of a hydrocephalic and amaurotic infant; and by himself and Schoen, drawing attention to other recorded instances of protozoon parasites and cysts occurring in the brain. Here the authors refer also to other cases—one, reported by Castellani, the other by Fedorovitch—which have some indirect bearing on the subject of the present paper, namely inflammations of the axial nervous system due to microsporidian parasites, and their bearing on Levaditi's theory of the microsporidian nature of the virus of rabies.

This paper describes a detailed experimental study of toxoplasmic encephalomyelitis, an acute (sometimes chronic) infection of the central nervous system with *Toxoplasma cuniculi*.

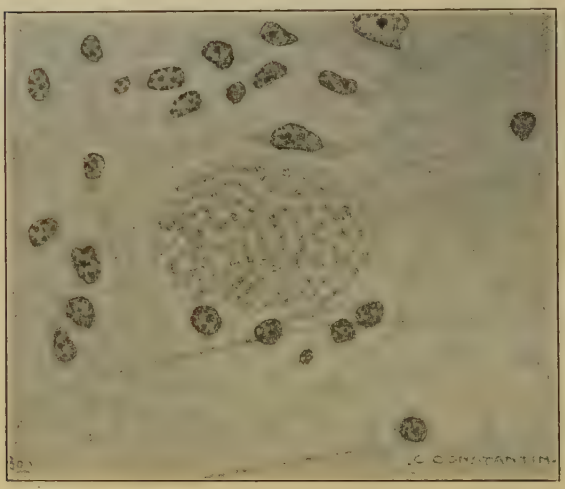
The stock of *Toxoplasma cuniculi* used in experiment was furnished by two rabbits which are described as "spontaneously infected" - the only two (of thousands whose axial nervous system has been

examined in the course of time) so distinguished in the authors' experience. These two rabbits had received intracerebral injections of brain-emulsion from animals that had been inoculated—inefficiently—with herpes, and the explanation suggested is that the site of the injection had been used as a port of call by Toxoplasma hailing from the spleen.

The fresh Toxoplasma virus thus obtained is increased in virulence by intracerebral passage through rabbits. Its infective power does not



Rabbit 691A. Toxoplasma cyst in cytoplasm of a neuron. ×900.



Rabbit 815A. Brain. Chronic toxoplasmic lesions. Large cyst containing Toxop asma, surrounded by lymphocytes. ×800.

[Reproduced from *Annales de l'Institut Pasteur.*]

last 48 hours, in glycerine on ice. Brain emulsions are not infective by the intracerebral route unless they are rich in Toxoplasma. Weak (diluted) emulsions, however, impart solid tissue immunity to subsequent dilutions of mortal strength.

Many pages are devoted to describing the receptivity of various species of animals to *Toxoplasma cuniculi*. The rabbit, guineapig, mouse, pigeon, chicken, and embryo chicken of 9 to 14 days (by inoculation into the egg) are all susceptible, particularly the rabbit, to which intracerebral infection is usually fatal in 6 to 12 days after

an exhibition of all the symptoms of an acute encephalitis complicated with myelitis. In the rat transcranial injection causes no symptoms, although the brain becomes infected with parasites. The dog, baboon, macacus, cercopithecus, and the adult fowl are refractory. The sites of infection and the routes by which it spreads are also discussed in detail. All the usual sites were tried, and the only one that proved to be not readily receptive was the intratesticular. The most favourable route both for penetration and further proliferation is the central nervous system; the optic and certain cranial nerves also serve for the spread of infection, but the peripheral nerves in general only serve for local proliferation, not for the spread of infection, and in this respect are unlike the neurotropic ectodermoses and neurovaccin. After proliferation in the brain the parasites may spread and multiply in spleen and liver and lung, even when they are not to be seen in the cerebrospinal fluid, blood, and kidney.

The pathological histology is described in particular detail. Briefly it is that of a nodular or diffuse parasitic inflammation spreading, in the perivascular tissue of the capillaries, through the brain, very intensely in the choroid plexus, and into certain cranial nerves. The Toxoplasma parasites are seen within the interstitial tissue cells, but rarely in the ganglionic cells, which, however, are much altered; they are well shown in the accompanying figures. The inflammatory processes in the choroid plexus may obstruct or obliterate the blood-vessels and so lead to dilatation of the lateral ventricles—indicating a tendency towards hydrocephalus.

Although the infection usually is quickly fatal, rabbits sometimes may survive more than 50, and mice more than 100 days. The changes in the brain and spinal medulla in these chronic cases are described, among them the Toxoplasma cysts resembling the cysts described by Janku in the hydrocephalic and amaurotic infant.

A. A.

Levaditi (C.) in collaboration with Sanchis-Bayarri (V.), Lépine (P.) & Schoen (R.). Etude sur l'encéphalo-myélite provoquée par le *Toxoplasma cuniculi*. (Deuxième Mémoire.) [**A Study of the Encephalomyelitis provoked by** *Toxoplasma cuniculi*. (**2nd Memoir.**)]—*Ann. Inst. Pasteur.* 1929. Sept. Vol. 43. No. 9. pp. 1063–1080. With 3 text figs. [8 refs.]

This paper treats of the mechanism of acquired immunity to infection with *Toxoplasma cuniculi*, and the tenour of its conclusions may be stated in a few words. Generally, if an animal (rabbit) have survived an ordinarily fatal inoculation of the living virus it is found to be refractory to several such subsequent inoculations. The acquisition of this immunity by inoculation of living virus has been confirmed by transcranial, intraocular, intradermic, and intravenous routes. Immunity to infection, however, is not imparted by the heated virus, nor by the specific serum, or even by an emulsion of dead virulent brain; and this last apparent paradox is explained by experiment showing that Toxoplasmas introduced into the living brain are there quickly and completely destroyed—that it is the living nerve-tissue that acquires immunity. In the authors' own phrase: In toxoplasmosis as in herpetic and neurovaccinal infections immunity is eminently

cellular. Each tissue-system defends itself by its own reactions to the virus which persist as long as the immunity lasts. "A state of latent cellular mobilization constitutes the defence on which the neuraxis stands fast each time that it finds itself in the presence of the virus against which it is solidly immunized." There follows a short account of artificial culture of the parasite; to the infected brain of a pigeon was added the embryo of a fowl and four boxes of Borrel, and an abundant culture followed from the third day, the cultures at 37° C. preserving their virulence for at least nine days. In an epilogue the authors emphasize the value of the study of Toxoplasma encephalitis in elucidating certain problems in neuropathology (e.g., the aetiology of hydrocephalus and other congenital forms of encephalitis) and the nature of the virus of rabies—quite apart from its explanation of the mechanism of the acquired immunity of the nervous axis as being exclusively a tissue-immunity eminently vital and independent of parasiticide properties of humours.

A. A.

Lwoff (Marguerite). Culture de *Leptomonas ctenocephali* Fantham var. *Chattoni* Laveran et Franchini, en milieux privés de sang frais: milieux liquides au sang chauffé. [**Cultivation of Leptomonas in Heated Blood Media.**]—*Bull. Soc. Path. Exot.* 1929. Apr. 10. Vol. 22. No. 4. pp. 247–252. [7 refs.]

Although fresh defibrinated blood is conducive it is not indispensable to the cultivation of Leptomonas; the organism can be cultivated indefinitely in peptonized media where the blood has been sterilized by heat.

A. A.

Nitsche (O.). Die pathologischen Veränderungen in der Milz bei Vogelmalaria. [**The Pathological Changes in the Spleen in Bird-Malaria.**]—*Arch. f. Wiss. u. Prakt. Tierheilk.* 1929. Nov. 25. Vol. 60. No. 5. pp. 410–425. With 3 coloured text figs. [2 pages of refs.] [Path. Inst. of Vet. High School, Berlin.]

This well-documented dissertation on pathological changes observed in the spleen in acute bird malaria is based on a minute study of more then twenty infections. The macroscopic changes in the spleen are summarized, along with other relevant matters, in a table; the microscopic changes, which are described at great length, are summarized as follows.

At about eight days hyperplasia and active cell-division are observed in the lymphatic follicles of the spleen; as yet there is no deposit of pigment. In two to three weeks hyperplasia of the follicles has reached its height, and small streaks of pigment are seen in plenty in the fixed cells and large mononuclear leucocytes in the parenchyma. After the third week the lymphatic follicles shrink and the scene of activity shifts to the parenchyma where there is accumulation of fixed tissue cells and of free mononuclears and macrophages, and massive deposit of pigment in all these elements of the pulp. After the fourth week the tumidity of the spleen decreases with the onset of induration and pigment mostly takes the form of fine intracellular dust.

A. A.

ALBRECHT (Bruno). Zur Biologie des *Plasmodium praecox* Grassi und Feletti (Proteosoma). [**Biology of** *Plasmodium praecox*.]—*Arb. a.d. Staatsinst. f. Exp. Ther. u. d. Georg Speyer-Hause zu Frankfurt a.M.* 1928. No. 21. pp. 1–9. [11 refs.] [State Inst. for Exper. Therapy & Georg-Speyer House, Frankfurt a.M.]

These not very novel biological observations are published as incidental results of a two years' chemotherapeutic study of a strain of *Plasmodium praecox* (from the Robert Koch Institute) in canaries.

The normal incubation period was between 5 and 7 days, with a possible prolongation to 16 days. The attack lasted 14 to 18 days, the endogenous development of the parasites in the blood ceasing simultaneously in all stages. A few birds were cured after their infection had run its course, as was proved by transmission of blood and material from various organs (liver, spleen, bone-marrow, brain), but they were easily re-infected ; in the great majority of birds the infection remained chronic with relapses in 2 to 3 per cent., or latent, and such birds were immune to re-infection with a homologous strain. Infection was transmitted to greenfinches, but other animals (dog, pigeon, sparrow, rat, and normal and desplenated white mice) were refractory.

A. A.

i. KATAHIRA (J.). Beitrag zur Kenntnis ueber Vogel-malaria (*Proteosoma praecox*). [**Contributions to Knowledge of Bird-Malaria** (*Proteosoma praecox*).]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1929. Aug. No. 293. [In Japanese. German summary pp. 41–43. [Faculty of Med., Imperial Kyuschu Univ., Fukuoka, Japan.]

ii. ——. Beiträge zur Kenntnis des *Proteosoma praecox*. [**Contributions to Knowledge of** *Proteosoma praecox*.]—*Zent. f. Bakt.* I. Abt. Orig. 1929. Nov. 30. Vol. 114. No. 7/8. pp. 502–509. With 12 graphs in text. [8 refs.] [Bact. Inst., Med. Faculty, Imperial Kyushu Univ., Fukuoka, Japan.]

i. This paper deals chiefly with the chemotherapy of bird malaria. The author recognizes two local races of *Proteosoma praecox*—one from the Java sparrow (Oryzivora), the other from *Fringilla kawarahiwa minor*—which are stated to differ in their course, circumstances of transmission, and immunological aspects, and in their appetite for birds and their susceptibility to quinine. With regard to the experimental infection in the Java sparrow the following statements are made in the Summary. A single injection of quinine in the early stage of an infection is often provocative of a relapse. The therapeutic effect of quinine seems to be greater in the ripe schizont stage than in the growing merozoite stage. Intramuscular injection of quinine is less precise in its effect than oral and intracardial injection. A simultaneous injection of sodium carbonate considerably enhances the effect of quinine. Prolonged administration of quinine is not curative. After quinine treatment most parasites are found in the spleen. If quinine is given in the incubation stage [of a first inoculation] the infection is suppressed, the blood is not infectious, and a reinoculation is ineffective, so long as the quinine is continued, but if quinine is given at the time of a re-infection none of these consequences follow—the infection pursues

its course. Experiments with plasmoquin, optoquin, euquinin, methylene blue, stibnal, synomenin, neosalvarsan, etc., showed that quinine was surpassed only by plasmoquin.

Some particulars are given of the difference between the Oryzivora (Java sparrow) race and the *F. kawarahiwa* race of *Plasmodium praecox*. The latter, which is transmitted by *Culex pallens*, has a shorter incubation stage (6 to 7 days) and a shorter crisis (9 to 11 days), and is very sensitive to quinine ; the former, which develops only to the ookinete stage in *Culex pallens*, has a longer incubation stage (9 to 11 days) and a longer crisis (15 to 16 days), and is little sensitive to quinine.

ii. This seems to be a German edition of the above paper. Here the experiments with quinine and plasmoquin are briefly defined and graphically represented, and the differences between the two races of *Proteosoma praecox* are minutely tabulated.

A. A.

TALIAFERRO (William H.) & TALIAFERRO (Lucy Graves). **Acquired Immunity in Avian Malaria. I. Immunity to Superinfection. II. The Absence of Protective Antibodies in Immunity to Superinfection.**— *Jl. Preventive Med.* 1929. May. Vol. 3. No. 3. pp. 197–208. With 1 text fig. [17 refs.] ; pp. 209–223. [15 refs.] [Dept. of Hyg. & Bact., Univ., Chicago.]

The object of the experiments here reported in detail is to ascertain some of the factors underlying the acquired immunity of canaries to bird-malaria. (This acquired immunity, as the authors recount in historical detail, has been demonstrated by several observers, and has been proved to persist only during the continuance of a latent infection —i.e., to be only an immunity to superinfection, not an immunity to re-infection after cure). In the first paper the authors, working with a specified strain of *Plasmodium cathemerium* (=*praecox* or *relictum*), confirm the existence of this acquired immunity and its long persistence, in canaries harbouring a latent infection. They show that the parasites introduced (in washed blood cells) into such a resistant bird are removed at all stages of the non-sexual cycle and that the rapidity of removal is in direct relation to the number of parasites injected. Thus when the number of parasites injected is approximately 1 to 100 per 10,000 red cells they are removed from the peripheral blood within 24 hours, and when the number is increased to 100 to 400 per 10,000, within 48 to 70 hours. They show also that the degree of immunity to superinfection may be less at the beginning of the latent infection than later.

In the second paper the authors show that the serum of birds having this acquired immunity to superinfection has *in usu* neither protective nor curative property. Its inefficacy as a protective was demonstrated variously—when injected through the peritoneum either in admixture with parasites, or immediately after them ; when injected intravenim the day after the parasites had been injected through the peritoneum ; when injected simultaneously with the parasites and thereafter injected alone daily for four days ; furthermore, its action could not be awakened by " passage," and it did not sensitize the parasites *in vitro*. Its inefficacy as a curative is inferred from the fact that 0·1 cc. introduced daily for 5 days into one bird after parasites had shown in its blood " exhibited no curative action," and that the rate of increase of the

parasites was "essentially similar" in 36 experiment birds that received varying doses of serum when parasites appeared in their blood, and in 18 control birds with typical infections.

The authors throughout define this immunity to superinfection as a parasiticidal "mechanism."

A. A.

Sergent (Edm.), Donatien (A.), Parrot (L.) & Lestoquard (F.). Sur l'existence de corps en grenade dans le cycle évolutif de *Gonderia mutans*. [**On the Occurrence of Plasma Bodies in the Life-Cycle of** *Gonderia mutans*.]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 542–544. [3 refs.] [Pasteur Inst. of Algeria, Algiers.]

The authors here verify the proof (by Theiler and Graf) of Brumpt's hypothesis that the life-cycle of *Gonderia mutans* (Theiler) comprehends schizogony of the *corps en grenade* type characteristic of França's genus *Theileria*. They agree therefore with Theiler and Graf that *Gonderia* of Du Toit is a synonym of *Theileria*.

A. A.

Kudo (R.). **Studies on Microsporidia Parasitic in Mosquitoes. VII. Notes on Microsporidia of some Indian Mosquitoes.**—*Arch. f. Protistenk.* 1929. Vol. 67. No. 1. pp. 1–10. With 61 figs. on 1 plate. [22 refs.]

From smears and from sections of preserved material the author describes and figures as new species *Thelohania indica* parasitic in the larva of *Anopheles hyrcanus* and *T. obscura* in the larva of *Anopheles funestus*. He also has illustrated notes on *T. legeri* which is parasitic in the larva of six Indian species of Anopheles. Furthermore, he gives lists of known Microsporidia parasitic in mosquito larvae and of their respective hosts. He states that heavily infected larvae die before pupation, but that a light infection is not fatal.

A. A.

Missiroli (A.). Sui microsporidi parassiti dell' *Anopheles maculipennis*. (**On the Parasitic Microsporidia of** *Anopheles maculipennis*.)—*Riv. di Malariologia*. 1929. July–Aug. Vol. 8. No. 4. pp. 393–400. With 25 figs. on 2 plates. [5 refs.] [English summary p. 479.]

The species of Thelohania described by Hesse and the 5 species described by Kudo as parasites of the larva of *Anopheles maculipennis* are mentioned, and the author here differentiates another species, *T. grassi*, that infests the eggs, and also hints at still another species very similar to the *T. legeri* of Hesse.

A. A.

Masing (Ernst). Ueber die Bedeutung des Magens für die Infektion mit *Balantidium coli*. [**On the Importance of the Stomach for Infection with** *Balantidium coli*.]—*Klin. Woch.* 1929. Dec. 17. Vol. 8. No. 51. pp. 2380–2382. [11 refs.] [1st & 2nd Med. Clinic, Dorpat, Estonia.]

Evidence is offered to justify the opinion that infestation by *Balantidium coli* is effected by way of the stomach. Tabulated details of 19 cases of balantidiasis observed during last year are given. Fourteen of the patients were over 50 years of age, and the youngest was 27; 18 had lived more or less in the country, 3 had tended pigs. In 9 cases

there was something suggestively wrong with the teeth; in 12 cases the contents of the stomach were examined regularly and all were found deficient in HCl in greater or less degree, down to alkalinity in one case. A study of cases recorded by other observers disclosed several observations of absence of free HCl and of atrophic and other changes in the gastric mucosa. Despite the well-known fact that *Balantidium coli* is quickly killed in vitro by 0·01 per cent. solution of HCl the author has often seen it alive in faeces giving the acid reaction with litmus. He therefore thinks that it may survive passage through the stomach under abnormal conditions of gastric subacidity.

A. A.

DA CUNHA (Aristides Marques) & MUNIZ (Julio). Sur l'enkystement du *Balantidium coli*. [**Encystment of** *Balantidium coli*.] —*C.R. Soc. Biol.* 1929. July 17. Vol. 101. No. 24. pp. 944–946. [Oswaldo Cruz Inst., Rio de Janeiro.]

- & . [In Portuguese & English.] Sobre o encystamento do *Balantidium coli* (nota preliminar). **On the Encystment of "*Balantidium coli*" (Preliminary Note).** *Inst. Oswaldo Cruz, Supplemento das Memorias.* 1929. Jan. & Feb. No. 5. In Portuguese pp. 26–29. With 1 folding plate. In English pp. 30–33.

In studying *Balantidium coli* in *Macacus rhesus* the authors have twice observed the phenomena of encystment and excystment. It took place in large numbers of the ciliate at once, so that in a single preparation 20 to 30 cysts were seen. The process seemed to be accomplished in 24 hours. After a day or two, during which cysts greatly predominated, they disappeared and large numbers of peculiar vegetative individuals took their place and are therefore inferred to be the issue of excystment.

In the process of encystment, as observed in fresh material, the Balantidium remained stationary, rotating violently. It became spherical, with a double contour. The striae of cilia and the peristome generally persisted, and the cytoplasm, which did not fill the cyst completely, became granular and full of inclusions, among them a large mass, or agglomeration of masses, which on treatment with lugol appeared to be glycogen or something similar. With gradual cessation of rotary movement encystment was complete. In stained preparations of this process cysts were seen in which the macronucleus had divided into two round nuclei and the micronucleus had disappeared - fused with the macronucleus. This binucleate form appears to be the ripe cyst; but quadrinuclear forms were occasionally seen.

The peculiar forms next seen in fresh material were elongate and flat and had a clear hyaline cytoplasm, free of inclusions, and two round nuclei each including 3 or 4 little granules encircled with a halo; in stained preparations these granules appeared as a single halo-circled mass the beginnings of the micronucleus. These elongate hyaline forms are called metacystic.

Followed up, the metacystic form divides, and then divides again, so that its final issue is a family of four ordinary vegetative individuals.

A. A.

Cicinnati (Attilo) & Denes (Giulio). Balantidiosi umana e balantidiosi suina. [**Balantidiosis of Man and Pig.**]—*Ann. di Med. Nav. e Colon.* 1929. July–Aug. Year 35. Vol. 2. No. 1–2. pp. 17–25. [Hyg. Inst., Univ., Padua.]

A comparison of Balantidium from a dysenteric case from Asia Minor with the ciliates from pigs in Padua lead the authors to the conclusion that the two are not identical. They describe differences in size, shape, position of cytostome and the arrangement and movement of the cilia.

C. M. Wenyon.

Sweeney (Marion A.). **A Comparative Study of the Action of Certain Drugs and Chemicals on *Balantidium coli*, Malmsten, in the Guinea Pig.**—*Amer. Jl. Hyg.* 1929. May. Vol. 9. No. 3. pp. 544–559. [34 refs.] [George Williams Hooper Foundation for Med. Research, Univ. of California, San Francisco, California.]

The discovery that the guineapig naturally harbours plentifully a Balantidium which in structure and dimensions conforms with the Balantidium of man and pig has led the author to study the effects of various drugs (of more or less repute in parasitic intestinal infections of man) upon this guineapig infection. In these experiments "the arsenicals were found to be the most effective chemo-therapeutic agents. Of these, stovarsol, tryparsamide, and parosan gave highest balanticidal action and lowest toxicity to the host." With them in suitable doses it was possible to destroy the parasites and cure the balantidiasis without poisoning the host; but in drawing inferences for practical usage, it must be remembered that the Balantidium of the guineapig does not injure the animal's intestine and appears to have no pernicious effect at all upon its natural host. Some compounds of silver (silver lactate and argyrol) had balanticidal property in safe doses, and are considered worthy of further trial; but silver nitrate was impotent. Of other drugs tested, ipecacuanha powder had some balanticidal effect; carbon tetrachloride in effective doses was generally toxic to the host; benzyl benzoate, yatren, emetine, and mercury salicylate and benzoate in effective doses were toxic to the host; and bismuth, thymol, and methylene-blue were useless. "The lack of correlation between *in vitro* and *in vivo* tests is again demonstrated."

A. A.

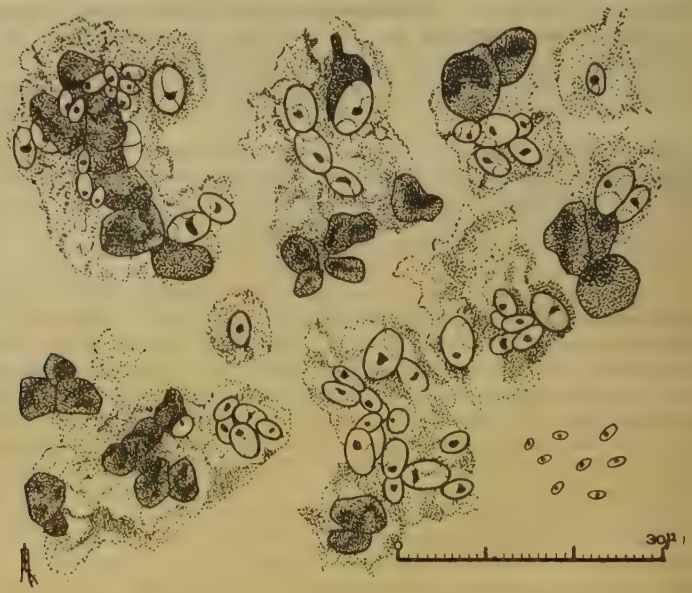
Curasson (G.). *Troglodytella abrassarti* infusoire pathogène du chimpanzé. [*T. abrassarti*. **a Pathogenic Infusorian of the Chimpanzee.**]—*Ann. Parasit. Humaine et Comparée.* 1929. Nov. 1. Vol. 7. No. 6. pp. 466–468. [1 ref.]

Some descriptive detail is here given of the Ophryoscolecid Ciliate *Troglodytella abrassarti* described in 1912 by Brumpt and Joyeux as a denizen of the intestine of the chimpanzee. The author states that in the south of the French Sudan it is common in chimpanzees, and although he allows that in nature it may be non-pathogenous, he is confident that in the captive anthropoid it causes a serious and even fatal diarrhoea—which, however, can be happily cured by yatren.

A. A.

COULON (G.). Présence d'un nouvel *Encephalitozoon* (*Encephalitozoon brumpti* n. sp.) dans le liquide céphalo-rachidien d'un sujet atteint de méningite suraigue. [**A New Encephalitozoon in the C.S.F. in Meningitis.**]—*Ann. Parasit. Humaine et Comparée.* 1929. Nov. 1. Vol. 7. No. 6. pp. 449–452. With 1 text fig. [5 refs.] [Antimalaria Lab., Porto Vecchio, & Parasit. Lab., Faculty of Med., Paris.]

The bodies here described and figured, which are said to resemble LEVADITI's Encephalitozoon in all but size, were found in the cerebrospinal fluid in a fulminating case of meningitis. The patient, a youth of 17 years, a Corsican villager, who had never left home except for the



Encephalitozoon brumpti, n. sp. All the parasitic forms found in the preparation are here represented. No budding forms resembling a yeast were observed. In the lower right hand corner of figure eight small bodies representing *Encephalitozoon cuniculi* are shown for comparison.

[Reproduced from *Annales de Parasitologie Humaine et Comparée.*]

annual summer migration to the hills, was suddenly prostrated by headache and fever. Next day vomiting supervened. The third morning he was comatose, with exaggerated symptoms of meningitis and an axillary temperature of 104° F., and also a considerable right exophthalmia with loss of ocular reflexes. The third night he died.

Lumbar puncture before death showed a fluid of normal tension and slightly opalescent, which on centrifugation disclosed, in clumps or isolated, a multitude of oval bodies, from $6\times4\mu$ to $2\times1{\cdot}25\mu$ in diameter, having a central deep-staining mass of chromatin and a faint-staining protoplasm. These bodies are here named *Encephalitozoon brumpti*. No autopsy could be made.

A. A.

Imms (A. D.). **Some Methods of Technique Applicable to Entomology.**—*Bull. Entom. Res.* 1929. Aug. Vol. 20. Pt. 2. pp. 165–171. [6 refs.] [Rothamsted Experimental Station, Harpenden.]

This paper gives some of the author's experience of methods of mounting, staining, and decolourizing microscopic preparations, of dissecting fluids, and of storage of material preserved in spirit, and also describes some improvisory methods of rearing insects. For mounting small and delicate objects he recommends De Faure's fluid, which "has the advantage of killing, fixing, and mounting in a single operation, without the necessity of any previous or subsequent treatment," except (in the tropics) ringing the cover-glass; its composition is gum arabic 30 gm., chloral hydrate 50 gm., glycerine 20 cc., distilled water 50 cc., chlorhydrate of cocain 0·5 gm.; after mixing the ingredients, filter. By virtue of the cocain De Faure's fluid fixes whole organisms in an extended condition. Also "a few hours after mounting, an object, such as a Dipterous larva, will exhibit its tracheal system with remarkable clarity"—even to the finer branches. For Acarines, the medium extensively used by Berlese, which also kills and fixes, so that living specimens can be placed on the slide and mounted in an extended condition in a single operation, is recommended. Berlese's fluid consists of distilled water 20 cc., chloral hydrate 160 gm., gum arabic 15 gm., glucose syrup 10 gm., acetic acid 5 gm. Gilson's Euparal is a useful mounting medium, since objects, stained or unstained, can be mounted in it straight from alcohol without any clearing operation; it is obtainable from Flatters and Garnett, Ltd., 309, Oxford Road, Manchester, in two forms, green and colourless, of which the author prefers the colourless. For the examination of minute delicate objects in the living condition, where, in the author's experience, normal salt solution often ruptures or distorts the parts, Ringer's fluid is recommended.

A. A.

Dunn (Lawrence H.). **Notes on Some Insects and Other Arthropods affecting Man and Animals in Colombia.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 493–508.

An annotated list of noxious insects collected and observed occasionally in the course of 15 months' work on yellow-fever control in Colombia. The list includes 5 species of Anopheles, two of which are notorious malaria carriers; 36 other species of mosquitoes, including *Aëdes aegypti*, *Culex* 5-*fasciatus* (=*fatigans*), and the *Psorophora lutzii* that distributes the eggs of *Dermatobia hominis*; a troublesome species of Simulium; 9 species of Tabanidae; the cosmopolitan stable-fly (Stomoxys), the screw-worm fly (Cochliomyia), and Dermatobia; 2 species of tick-flies (Hippoboscidae); the chigger, the dog-flea, and *Pulex irritans*; the ubiquitous head, body, and crab lice and bed-bug; a species of Conorhinus (Triatoma); *Argas persicus*, the two notorious S. American species of Ornithodorus, and 6 species of hard ticks.

A. A.

Shannon (Raymond C.). **Entomological Investigations in Connection with Carrion's Disease.**—*Amer. Jl. Hyg.* 1929. July. Vol. 10. No. 1. pp. 78–111. With 6 text figs. & 2 plates. [43 refs.]

A full report of an expedition to Peru to collect blood-sucking Arthropoda for use in the Noguchi (Rockefeller) investigations of

verruga. The author begins with a historical review of the subject, from ARCE (1889), who first suggested the agency of a blood-sucking arthropod in the transmission of the disease, to NOGUCHI (1926), who transmitted *Bartonella bacilliformis* in monkey (Rhesus) experiments by means of ticks (*Dermatocentor andersoni*), and including a longish notice of the experiments of TOWNSEND (1912–1914) which implicated Phlebotomus and in particular *P. verrucarum* as the transmitter. The author's observations are confirmatory of TOWNSEND. There follows a systematic and descriptive account of the three species of Phlebotomus found in the verruga zone, a summary of the ecological evidence indicating Phlebotomus as the agent, and an interesting account of the conditions of existence—topographical, physiographical, seasonal, faunal—in the Rimac valley, in one region of which—the "verruga zone"—these conditions are exclusively favourable to Phlebotomus. The habitats, habits, and behaviour of the insect in this zone are described, along with some fine illustrations of the country and the author's personal experience of it. Opinions regarding natural reservoirs of the infection are discussed, but no original observations are offered. A list of about 66 species of arthropods of medical and veterinary interest collected, and a bibliography, conclude this admirable report.

A. A.

HECHT (Otto). Ueber Insektenstiche. [**Insect Bite.**]—*Dermat. Woch.* 1929. June 8 & 15. Vol. 88. Nos. 23 & 24. pp. 793–810; 839–848. [Numerous refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

This elaborate compilation is a study of the variable effects of the attack of common blood-sucking insects. It concentrates attention on the known effects of their bites upon the human skin and on the antecedents of these effects in the secretions injected in the process of sucking, and, since it is addressed mainly to dermatologists, morphology, physiology and all other aspects of entomology are purposely excluded. A valuable feature is the voluminous bibliography.

A. A.

LAMBORN (W. A.). **Medical Entomologist's Report.**—*Nyasaland Protectorate Ann. Med. Rep. on the Health & Sanitary Condition for Year ending 31st December, 1928.* Appendix I. pp. 35–38.

This concise and interesting report records the failure to stop the migration of tsetse-fly by simple clearing in the Dowa and Fort Manning Districts of Nyasaland. Notwithstanding the extension of the previous clearings (250 to 1,000 yards broad) to a total length of over 30 miles in the former and over 20 miles in the latter district, the fly has continued to advance, independent of any movement of game, and has been observed to be breeding. The advance was favoured by the coarse high grass, which—quickened by the natural fertility of a virgin soil and fertilized by the wood-ash from the combustion of the felled trees—soon extended from end to end of the clearings. It is now realized that to make clearings really effective against invasion of fly they must be broader (a minimum of 2 or 3 miles) and must be cultivated by a settled native population, and this is the scheme presently to be

introduced. The land is suitable for high grade tobacco, and it is hoped that European planters may take it up. Furthermore, the headman of each native colony will be armed with a rifle and a limited amount of ammunition to boom off trespassing game.

The reporter narrates his misfortunes—mostly of a kind unknown to workers in the palatial laboratories of the higher civilization—in pursuing an experimental inquiry into possibilities of a cyclical transmission of trypanosomes by Ixodine ticks. Despite vicissitudes, he is able to describe in concise but sufficient detail one complete series of experiments with *Rhipicephalus sanguineus*, the results of which are negative. Neither in larva nor in nymph stages did representatives of this species take infection, although in both cases large batches of clean home-bred individuals were allowed to feed to repletion on heavily infected animals, and in their subsequent stages were put to a test on healthy animals. The inquiry is in progress with other species of ticks.

The reporter gives confirmation of his earlier discovery of the gradual disappearance during the dry season at altitudes of about 3,000 feet and upwards (but not at the level of the lake = about 1,500 feet) of the common malaria-carrying anophelines of the country (*A. gambiae* and *A. funestus*)—a disappearance that lasts until the next wet season is well set. The other local species—*A. rhodesiensis*, *A. longipalpis*, and *A. pretoriensis*—have not been criminated with malaria, and *pretoriensis* is not even accused of persistent house-frequenting. In correlation with these observations, he has now found by blood examinations that in the children of the highlands (3000 + feet) the parasite-rate in the advanced dry season (October and November) fell almost to nil, but was followed by a conspicuous rise shortly after the onset of the rains (April and May). In respect of these seasonal differences in the parasite-rate, in highland children only, these observations are a confirmation of facts reported in 1925 and 1926. " These facts suggest a degree of resistance such as might well lead, in the absence of Anopheline vectors, to a reduction of gamete carriers to a point at which systematic treatment by drugs might be feasible." A suggestive addendum to the observations described above is that in a ravine where the presumably harmless anophelines (*A. rhodesiensis*, *A. longipalpis* and *A. pretoriensis*) that are persistent during the dry season breed five baboons were shot, of which three had a species of Plasmodium in their blood ; this Plasmodium has been referred to Dr. J. G. Thomson.

A. A.

Carter (Henry F.). **Report of the Medical Entomologist for the Year 1928.**—*Ceylon Administration Rep. of the Director of Med. & San. Services for 1928.* 1929. Sept. Appendix 2. pp. C63–C66.

That part of this report which tells of research in the laboratory and practical work in the field comes under the heading of malaria infection and mosquito surveys. Of 1,627 Anopheles of seven species collected in huts and coolie-lines in various parts of the country for evidence of natural infection, 1,319 were *A. culifacies*, which (along with *A. subpictus*) is the species of prevailing frequency inside dwellings. Of these 1,319 *culicifacies*, 69 were found infective, in 6 cases both in stomach-wall and salivary glands. So far, then, *A. culicifacies* is the only species known in Ceylon to be naturally infective, but, as is pointed out, examination of other species, particularly *A. listoni* and *maculatus*, is

deficient. The infected individuals were taken chiefly in December and January, but some also in February, March, August, September, and November. Mosquito (larva) surveys were accomplished at Diyatawala and Trincomalee, and at 13 railway stations; altogether 2,934 potential breeding-places were examined and 46,592 larvae identified, and the results were recorded and mapped. At Diyatawala *A. maculatus* (47 per cent.) was the prevalent species. At Trincomalee larvae were found in 43 per cent. of the 887 wells examined, *A. listoni* being predominant. Experiments with Paris green as a larvicide were unsatisfactory; the coir-dust used as a vehicle is too flocculent and the sprays used to distribute it are not powerful enough to deal with road dust.

A. A.

Beattie (Mary V. F.) & Howland (Lucy J.). **The Bionomics of Some Tree-Hole Mosquitos.**—*Bull. Entom. Res.* 1929. May. Vol. 20. Pt. 1. pp. 45–58. With 6 text figs. & 3 figs. on 2 plates. [12 refs.]

This paper presents in concise yet assiduous detail the results of an attentive microcosmic survey—three rot-holes in three several trees among the celebrated Burnham beeches in Buckinghamshire. In the fauna of this little world—Rhizopods, Heliozoa, Ciliates, larvae of a Chironomid, of an Anthomyiid and of a Syrphid, a beetle, and a Nematode—the larvae of 3 mosquitoes—*Anopheles plumbeus, Finlaya geniculata, Orthopodomyia pulchripalpis*—were conspicuous, and attention is directed particularly to them. The Anopheles larvae were found throughout the year, most from September to December.

The water was rich in organic matter. No correlation was observed between its H ion concentration, dissolved oxygen, chlorides, solids, and ammonia-nitrogen and the incidence of larvae, but the total organic nitrogen was thought to be a determinative factor. The contents of the gut of 138 larvae were analysed and were found to consist, generally, of "small algae, a few animals, bacteria, and considerable quantities of rotting vegetation." The impression given was that the amount of algal and animal food was insufficient for nourishment and was probably supplemented by vegetable débris and perhaps by bacteria.

A. A.

de Boissezon (P.). Expériences au sujet de la maturation des oeufs chez les culicides. [**Experiments on the Maturation of Culicid Eggs.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 683–689. [1 ref.]

The author has already recorded his observation that during the winter of 1928–29 mosquitoes (*Culex pipiens*) living in a warm cellar containing a puddle of water, but no food of any kind, produced eggs that gave issue to larvae. In the present paper he records in ample detail a series of experiments made in May and June to elucidate this remarkable phenomenon.

In one series of 3 experiments pupae of *Culex pipiens* were placed in a vessel of distilled water, within a cage. Adults of both sexes emerged in due course; were not fed; and died in a few days. In one experiment a small raft of ten eggs was left on the water, and these eggs hatched. The temperature was 16° C.–18° C.

In another series of 4 similar experiments the water used was from the puddle in the cellar where the original observations were made. In one of these experiments (temperature 20° C.–26° C.) a raft of 20 eggs was left.

In a third series of 3 experiments larvae from a stock fed on apples were caged in water containing in one case powdered yolk of egg, in another case shredded white of egg, and in another case powdered blood-clot. Pupation and emergence of adults followed; the adults were not fed, but all the females in these experiments produced rafts some of which contained 100 eggs and were as well formed as those of a female fed on blood. The temperature in these experiments rose to 26° C.

The author's generalizations are that it is possible for the female of *Culex pipiens* under rigorous starvation to produce eggs, the necessary energy for the maturation of the eggs coming entirely from the nourishment assimilated in her larval stage—particularly from a nourishment rich in proteins.

A. A.

MACGREGOR (Malcolm E.). **The Significance of the pH in the Development of Mosquito Larvae.**—*Parasitology*. 1929. May. Vol. 21. Nos. 1 & 2. pp. 132–157. With 1 text fig. [42 refs.] [Wellcome Field Lab., Wisley, Surrey.]

This is a good paper and should be read by all who are interested in the subject.

The author summarizes the observations of the numerous workers who have criticized his suggestion that the healthy development of mosquito larvae is directly affected by the pH index of their watery home. His further observations and experiments, here reported, show, as he originally observed, that if under natural conditions the pH of a water be changed, the development of the larvae living in it is affected adversely—but that this, as he now discovers, is *not* so under bacteriologically sterile conditions. Consequently although the pH of the water may exercise no direct action on the larvae it may indicate the fitness or unfitness of the water as a chemical or biological medium—e.g., its fitness or unfitness to maintain a suitable plancton. This view of the usefulness of the pH index as an indication of the suitability of the water as a source of food is supported by the author's further investigation of the "suspended development" stage of many species of mosquito larvae. This stage, which in his experience has been observed only in the laboratory, can there be ended or induced by altering the pH, and is explained by him as a gradual or temporary starvation due to disappearance of certain microorganisms (which may also, as he states, be brought about by fall of temperature, and possibly by other agencies).

The author, who is master of a fine technique, also describes here a new method for highly successful cultivation of "*Aedes argenteus*" larvae and pupae under bacteriologically sterile conditions.

A. A.

Sébenzow (B. M.) & Adowa (A. N.). La réaction actuelle du milieu dans l'écologie d'*Anopheles maculipennis* Mg. [**The Reaction of the Medium in the Ecology of** *Anopheles maculipennis*.]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 584–606. With 3 text figs. [8 refs.] [Trop. Inst., Moscow.]

During the last two years a series of papers by these and other associated authors has been noticed from time to time in this *Bulletin*, on the oecology of *Anopheles maculipennis*. By observation in nature they had noticed in the vicinity of Moscow that sedgy (Carex) marshes, with a high pH (6·6–7·8), a high O tension, and a rich plancton, are favourable for the larvae; while bogmoss (Sphagnum) marshes, with a low pH (3·7–5), a low O tension concurrent with a high percentage of organic matter, a high refractive index along with a low mineral content and a poor plancton, are unfavourable. On this observation the authors studied these two types of waters in the laboratory in very great detail, of which they have already published piecemeal results. The present comprehensive paper covers this same ground and brings us to the authors' conclusions. Again, by modifying the waters in various ways—by acidulation, by alkalization, by mineralization (enrichment with calcium) by decalcification, etc., and by comparison with distilled water they have sought out the one particular circumstance that determines the conditions of life for the larva of *Anopheles maculipennis*. In their conclusions they decide that the chemical reaction of the water is that determinative factor—for this species "a pH5 is the biological threshold below which the larvae perish in their first stage." It is enough to alkalize bogmoss water, notwithstanding all its imperfections, to make it highly favourable for larvae. As to how the chemistry of the water acts, they consider that it must be on the larval processes of nutrition, not upon the quantity and quality of food, not upon the plancton. They think, indeed, from their observation of the course of events in distilled water, that in nature there cannot exist any water so poor in plancton as to fall short of the requirements of mosquito larvae. The authors' conclusion of the whole matter is, for practical purposes, that success in antilarval measures against *Anopheles maculipennis* can be assured by reducing the pH of the water to 4—the limit of tolerance being 4·3.

A. A.

Matheson (Robert) & Hinman (E. H.). **Further Studies on Chara spp. and Other Aquatic Plants in Relation to Mosquito Breeding.**—*Amer. Jl. Trop. Med.* 1929. July. Vol. 9. No. 4. pp. 249–266. With 5 text figs. [10 refs.] [New York State College of Agric., Cornell Univ., Ithaca, New York.]

Continued studies both in nature and in the laboratory of the effect of *Chara fragilis* on mosquito breeding in the New York (U.S.A.) area. The conclusion of them all is that in clean water with Chara in vigorous growth mosquito breeding is inhibited, but that when the Chara begins to decay egg-laying and development of larvae proceed normally, unless the Chara recovers its vigour. A comparative study of the plancton of Chara water was started, with the rather surprising result that that of the Chara waters was found to be more abundant and more varied than those of the pool chosen for comparison and of the authors'

aquaria. [But since the chosen pool was a woodland pool, and only the bacteria seem to have been studied in the various experimental aquaria, this paradoxical result needs confirmation.]

A. A.

FEEGRADE (E. S.). **Experiments to note the Larvicidal Effects, if any, of Sodium Nitrate, Potassium Nitrate, and Magnesium Sulphate in Natural Waters.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 249–250. [Harcourt Butler Inst. of Public Health, Rangoon.]

In these experiments sodium nitrate added gradually to ordinary tank (=pond) water up to 30 gm. per 1,000 cc. of water had no effect on mature larvae of *Aëdes aegypti* (=*argenteus*); potassium nitrate up to 25 gm. had no effect, but at 30 gm. was fatal in 48 hours; a combination of 10 gm. potassium nitrate and 8 gm. sodium nitrate was fatal in 48 hours; and a combination of 10 gm. potassium nitrate and 8 gm. magnesium sulphate was fatal in 17 hours.

A. A.

SERGENT (Edm.), SERGENT (Et.) & PARROT (L.). La destruction des moustiques par les poissons dans l'Afrique du Nord. [**Destruction of Mosquitoes by Fish in North Africa.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1929. Aug. Vol. 51. No. 8. pp. 590–602. With 11 text figs. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

The authors remind us of the qualifications necessary for fishes that are to be employed to hunt out and destroy Anopheles larvae hiding in shallow weedy waters; they must be small, agile, voracious and able to seize their prey either at the surface or below it, prolific, and adaptable to varied conditions of life. Such are the fishes of the cosmopolitan family Cyprinodontidae. In Northern Africa four indigenous species of this family are found useful for the destruction of Anopheles larvae—namely, *Cyprinodon iberus* and *C. fasciatus*, *Tellia apoda*, and *Phoxinellus chaignoni*, all of which are figured here. Also two very efficient American fishes have been acclimatized in Northern Africa, namely, the redoubtable Cyprinodont *Gambusia holbrooki*, and the perciform *Eupomotis gibbosus* which belongs to the Centrarchid family.

A. A.

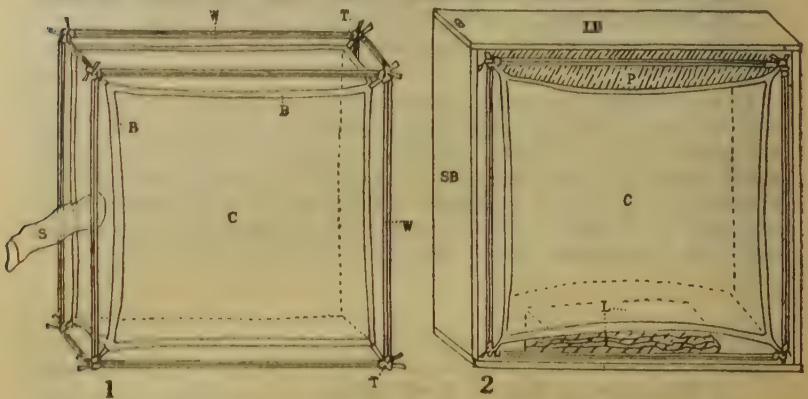
MACGREGOR (Malcolm E.) & LEE (Chung Un). **Preliminary Note on the Artificial Feeding of Mosquitoes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1929. Aug. 26. Vol. 23. No. 2. pp. 203–204. [Wellcome Entom. Field Lab., Wisley, Surrey, & Peking Union Med. College, Peking.]

The authors confirm the fact that mosquitoes do not suck blood indiscriminately. In their observations *Anopheles maculipennis*, *Culex pipiens*, and *Aëdes argenteus* could not be induced even under stress of starvation to feed on the birds offered. Citrated blood was then tried in vain, but when honey was mingled with it not only did the females but the males also feed on the mixture to repletion. The blood mixture was taken almost entirely into the diverticula, not into the stomach.

A. A.

BARRAUD (P. J.). **A Simple Method for the Carriage of Living Mosquitoes over Long Distances in the Tropics.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 281–285. With 2 text figs.

The gauze inclosure for the mosquitoes is tied inside its rigid framework (as a mosquito-net is tied to the frame carried by the bed-posts),



1. Wire frame and cage, showing method of securing latter inside former.
2. Method of packing cage in box (one side of box removed to show interior).

Lettering: W, wires forming frame; T, tapes fastening wires of frame to one another and securing cage to frame; C, cage made of small mesh mosquito netting; S, sleeve; B, tape binding to edges of cage; P, cotton wool pad filling space between lid of box and top of cage, holding in place some raisins resting on mosquito netting; LB, lid of box; SB, side of box; L, pad of wet lint lying on bottom of box and sufficiently thick to press against mosquito netting forming bottom of cage.

[Reproduced from *Indian Journal of Medical Research.*]

and the whole is packed in a well-fitting box furnished at bottom with a pad of wet lint. Before the box is closed some suitable food is placed on top of the gauze inclosure. The method has been successfully tested in India for long distances and hot and dry seasons.

A. A.

MARSHALL (J. F.) & STALEY (J.). **The Graphical Representation of Instar Records in a Regional Mosquito Survey.**—*Bull. Entom. Res.* 1929. Aug. Vol. 20. Pt. 2. pp. 195–198. With 2 figs. [British Mosquito Control Inst., Hayling Island.]

The paper illustrates a chart on which routine observations of mosquito larvae are plotted for six continuous months. The chart consists of seven columns, one of which contains, in file, the names of the individual species under observation, and the other six are headed each by the name of the month. Between the names of the species horizontal lines are continued across the seven columns, so that each species is provided with a train of compartments in which its appearances are plotted month by month. Thinner horizontal cross-lines divide every compartment into four spaces, in which each of the four instars of each species is separately plotted. At the foot of each column a space is

left for monthly record of rainfall. Tabular forms for notes of special interest on dates indicated by circles on the chart and for records of species-associations are also exemplified.

A. A.

Faust (Ernest Carroll). **Mosquitoes in China and their Potential Relationship to Human Disease.**—*Jl. Trop. Med. & Hyg.* 1929. May 15. Vol. 32. No. 10. pp. 133–137. With 1 map in text. [16 refs.]

The author complains that China is still "one of the least worked, yet most fruitful, fields for investigation in faunistic parasitology," and again that "fifty years after Manson's epochal discovery the actual facts concerning mosquitoes in relation to human disease in China are indeed meagre." With regard to malaria "the entire problem of anopheline transmission in China is one in which only the most superficial beginning has been made." With regard to dengue fever we know something about the distribution of *Aëdes aegypti*, but not whether any other Aëdes species (e.g., *albopictus*) can transmit the disease, although there is good ground for the belief that some other species must do so north of Hongkong. And in respect of filariasis, although it has been proved recently that *Culex pipiens* is an intermediate host of the parasite in northern Kiangsu (just north of the range of *C. fatigans*), "very few attempts have been made to continue in the Far East the work initiated by Manson." The paper is illustrated by a good sketch map of China showing the southerly range of Palaearctic species of mosquitoes and the northerly range of Oriental species, and the intervening zone where *Anopheles hyrcanus* [=*sinensis*, a species common to both regions] is the predominant anopheline.

A. A.

Paine (R. W.) & Edwards (F. W.). **Mosquitos from the Solomon Islands.**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 303–316. With 2 text figs. & 4 figs. on 2 plates.

Twenty-three species of mosquitoes are here listed from the Solomon Islands. The list includes *Aëdes argenteus* (=*Stegomyia fasciata*), *Aë. variegatus*, *Aë. albolineatus*, *Culex fatigans*, and one Anopheles—*A. punctulatus*.

A. A.

Marshall (J. F.) & Staley (J.). **A Newly Observed Reaction of Certain Species of Mosquitoes to the Bites of Larval Hydrachnids. Preliminary Contribution.** *Parasitology*. 1929. May. Vol. 21. Nos. 1 & 2. pp. 158–160. With 3 text figs. [1 ref.] [British Mosquito Control Inst., Hayling Island.]

An illustrated description of "dark, serpentiform, tubular processes, originating at the points where the mouth-parts of the larval mites were attached to the host and penetrating within the abdomen to distances varying from 0·5 to 1·0 mm." The said processes, which remained in situ after the mites had been detached from the host, were found by the authors in a large number of female mosquitoes (chiefly *Aëdes cinereus*) to which these mites were adherent. The said mites are larvae of a water-mite. The authors state that similar processes were figured by Brandis (1897) as present in the skin of a hedgehog attacked by harvest-mites (Leptus), and that that author apparently mistook them for the mouth-parts of the

mite. [The tubular processes are, no doubt, the deciduous stylostomes of the mites. For a good and well-illustrated account of the nature, formation and function of the stylostome see Marc André, *Bull. Mus. d' Hist. Nat.* Paris, 1927. Vol. 33. pp. 509-515.]

A. A.

Kumm (Henry W.). **The Geographical Distribution of the Malaria Carrying Mosquitoes. A Collection of Recorded Material in the Literature and in Personal Communications to the Author.**—*Amer. Jl. Hyg.* Monographic Series. 1929. Aug. No. 10. pp. iii+ 178. With 39 maps. [397 refs.]

A summary, compiled from published records, of the geographical distribution of the species of Anopheles known to be carriers of malaria parasites. Two species which "rarely, if ever, transmit malaria" are included, and 16 species "which have at one time or another been suggested as possible malaria vectors" or do not "seem to be of major importance" are excluded. The 34 species included in the summary are arranged in alphabetical order, and for each species the continents and countries and separate localities of its reported occurrence are stated (usually with the authority for the statement) and plotted on a map.

A. A.

Swellengrebel (N. H.) & Doornbos (W. H.). **On the So-Called "Daily Turnover" of the Anopheline Population in Resting-Places and its Bearing on the Evaluation of the Anopheline Incidence to test the Effect of Antilarval Measures.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam.* 1929. Vol. 32. No. 5. pp. 669–678. With 2 figs. [13 refs.] [Inst. of Trop. Hyg., Amsterdam.]

This paper, which deals with anopheline counts (*A. maculipennis*) in North Holland made for determining the effects of anti-larva operations on the anopheline population within the area of operations by comparison with the anopheline population outside it, is too full of small detail to be abstracted. The conclusion of general interest is that mere daily counts do not furnish reliable data for estimating local anopheline density unless the nature of the resting-places (e.g., whether a stable affording an abundant food supply attractive to female visitors, or an open uninhabitated outhouse) and the "physiological status" (sex and season) of the anopheline residents be observed in the routine. The authors appear to have been satisfied with the evidence from daily catches in open uninhabited shelters, with perhaps fortnightly catches in stables.

A. A.

La Face (Lidia). Morfologia delle larve anofeliche e descrizione delle specie italiane. (**Morphology of the Anopheline Larvae and Description of the Italian Species.**)—*Riv. di Malariologia.* 1929. Sept.–Oct. Vol. 8. No. 5. pp. 538–568. With 7 text figs. & 39 figs. on 12 plates. [23 refs.] [English summary p. 634.] [Experim. Station, Anti-Malaria Campaign, Rome.]

This paper reviews the general morphology of the anopheline larva, including the author's own observations chiefly on pilotaxy, and describes in detail the several stages of the larva of each Italian species —*maculipennis*, *pseudopictus*, *bifurcatus*, *superpictus*, and *algeriensis*—

and the differential characters of *elutus*. In the case of *algeriensis*, the description and figure of which are said to differ somewhat from those of SERGENT, the egg also is described.

A. A.

BARBER (M. A.) & KOMP (W. H. W.). **Breeding Places of Anopheles in the Yazoo-Mississippi Delta.**—*Public Health Rep.* 1929. Oct. 11. Vol. 44. No. 41. pp. 2457–2462.

The incidence, in the breeding-places in a district in the Yazoo-Mississippi Delta, of *Anopheles quadrimaculatus*, *A. punctipennis*, and *A. crucians*, as observed month by month over a term of four years, is here tabulated and discussed. *A. quadrimaculatus*, which is by far the commonest species and is the chief malaria-carrier, adapts itself to breeding-places of various types and its larvae may be found in almost every month of the year. *A. punctipennis* is also common and considerably adaptive. *A. crucians* is comparatively rare.

The Delta of the definition is, of course, the broad alluvial (inhabited) delta plain, where the breeding-places are ancient river channels and "ox-bow lakes" (mortlakes), swamps, ponds and springs, as well as borrow-pits and artesian wells; some of them are shaded by timber and some are exposed to the sun.

The practical conclusion of the study is that antimosquito drainage is a too expensive proposal unless, perhaps, as coming within the scope of a large project for the reclamation of land.

A. A.

GATER (B. A. R.) & RAJAMONEY (P. D.). **A Summary of Records of Anopheline Breeding-Places in Malaya.**—*Bull. Inst. Med. Res. Federated Malay States.* 1929. No. 2. 33 pp.

This valuable publication, although it embodies the results of more than twenty thousand collections of anopheline larvae made, during a "considerable" term, in pools, drains, swamps, ponds, rice-fields, streams, seepages, wells, and other waters "miscellaneous" and "artificial," does not claim to be a complete survey of the anopheline breeding-places of Malaya. It is sufficiently wide and varied, however, to support certain generalizations, of which one of the most important is that "the majority of anopheline larvae are far more adaptable than is generally thought." For instance, *Anopheles maculatus*, whose larvae are supposed to prefer clean water, continued to breed and multiply in plantation drains that were gradually and deliberately fouled to the stinking point, and also in pits containing some decomposing cow dung. Of the 24 species studied only two—*A. asiaticus* and *A. watsoni*—were restricted to one particular habitat, namely, bamboos. At the other extreme larvae of *A. aconitus*, *hyrcanus*, *kochi*, *maculatus*, and *vagus* were found in all the breeding-places specified above, and *A. barbirostris*, *fuliginosus*, and *karwari* in all but one.

A. A.

SIMMONS (James S.). **Malaria on the Island of Corregidor, P.I. II. Report of a Survey for Anopheline Mosquitoes, made December, 1928.**—*Milit. Surgeon.* 1929. June. Vol. 64. No. 6. pp. 906–911. [3 refs.] [U.S. Army Med. Dept., Research Board, Bureau of Science, Manila, P.I.]

Corregidor, a small island of political importance in the Philippines, has generally been regarded as free from malaria; a report of 1925 stated

that no anophelines had been found there for two years. In 1928, however, malaria was found to be endemic among the natives, and some larvae of Anopheles were detected in a fresh filled watering trough. Since then five species of the genus—namely, *A. hyrcanus* (=*sinensis*), *A. karwari*, *A. ludlowii*, *A. minimus*, and *A. rossii*—have been discovered freely breeding chiefly in pools in ravines. Measures of control are in prospect.

A. A.

MANALANG (C.). **The Buccopharyngeal Armature of Philippine Anophelines.** —*Philippine Jl. Sci.* 1929. Apr. Vol. 38. No. 4. pp. 431–434. With 16 figs. on 4 plates. [2 refs.]

The author has examined the buccopharyngeal armature of the several Philippine species of Anopheles and finds agreement with the statements of BARRAUD and COVELL (see this *Bulletin*, Vol. 25, p. 814) respecting the same species in India—with the single exception of *A. ludlowi*. In this case he finds individuals that judged by the spotting of the legs would be varieties of *A. ludlowi*, and judged by the buccal armature would be varieties of *A. subpictus*. [A good animadversion on the "making of species" without profound meditation upon the first six chapters of DARWIN's imperishable *Origin of Species*.]

A. A.

KADLETZ (N. A.) & KUSMINA (L. A.). Experimentelle Studien ueber den Saugprozess bei Anopheles mittels einer zwangsweisen Methode. [**A Method of Compulsory Feeding for Study of Suction in Anopheles.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. June. Vol. 33. No. 6. pp. 335–350. With 2 text figs. [28 refs.] [Lab. of Malaria Station, Samara, U.S.S.R.]

The authors recount and criticize the various methods in vogue for feeding mosquitoes in experimental observations and describe and explain the superior accuracy and other advantages of their own method. By this method a single insect is immobilized between a piece of paper and a glass slide, and is fed as required through a capillary tube into which the insect's proboscis is inserted. They say that the insect usually begins to suck whenever the tube is flooded, and that a single insect thus permanently fixed can be fed many hundreds of times and with any required variety of fluid, the process of suction being always under studied observation. The manipulations of this method must be followed from the original figures.

A. A.

SWELLENGREBEL (N. H.), DE BUCK (A.) & SCHOUTE (E.). **On Anophelism without Malaria around Amsterdam. (Third Communication.) On the Food of Adult *Anopheles maculipennis* in Malarious and Non-Malarious Regions.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam.* 1929. Vol. 32. No. 6. pp. 772–779. [7 refs.] [Inst. of Trop. Hyg., Amsterdam.]

The authors have made comparison between the malarious and the non-malarious districts around Amsterdam in respect of house-frequency of *Anopheles maculipennis*, stable-frequency, percentages of house-frequenting females full of blood, percentages of such females full of *human* blood, and average number *per house* of females containing

human blood (which last item they make the datum of "effective incidence" for malaria transmission). The comparisons have been made in early summer, in midsummer, and in autumn. The details and the tabulated statistics must be consulted in the original paper. The conclusion of the investigations is that "the strain of Anopheles in non-malarious regions [the long-winged paucidentate strain] is as likely to act as a vector during the malarial season as the one [the short winged pluridentate strain] prevalent in malarious areas."

A. A.

Swellengrebel (N. H.). **On the Influence of the Wind in the Spread of *Anopheles maculipennis*.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 419–434. With 4 maps. [27 refs.] [Inst. of Trop. Hyg., Amsterdam.]

In a maritime tract in Holland, having sea on three sides, where Anopheles breeding was under control in a radius of 3 km. from a seaward centre, it became necessary to account for the presence of Anopheles that, there was good reason to believe, must be invaders from breeding-places further inland. Experiments with stained insects pointed to the influence of wind. The experiments are described and illustrated in detail, and the general conclusion from them is that "wind is of more importance in the dispersion of *A. maculipennis*, as a means of transport in the direction towards which the wind is blowing, than may be gathered from the current literature."

A. A.

Gater (B. A. R.) & Rajamoney (P. D.). **Notes on Handling *A. maculatus* Theo. for Experimental Purposes.**—*Malayan Med. Jl.* 1929. Sept. Vol. 4. No. 3. pp. 88–91. [6 refs.]

In describing in much detail their own methods of preference no novel principles are disclosed, but emphasis is laid on the necessity of securing a constantly humid atmosphere for maintaining mosquitoes in long and healthy life, and for withholding food for some time before offering them an infective feed. References to other methods are appended.

A. A.

Ananiane (S. A.). Sur la biologie d'*Anopheles pseudopictus* Grassi dans l'Ouezd d'Etchmiadzin en Arménie et sur la lutte conduite contre les moustiques hibernants. [**The Biology of *Anopheles pseudopictus* in Etchmiadzin in Armenia and on Methods of destroying Hibernating Mosquitoes.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 6. pp. 425–428. With 1 text fig. [In Russian. French summary p. 428.]

From the not very coherent or consistent summary it appears that in ten villages adjacent to Etchmiadzin (in Armenia) the predominant hibernating mosquito is *Anopheles maculipennis* (96 to 98 per cent.). The only other Anopheles hibernating in the imago stage is *A. superpictus* (0·5 to 2 per cent.). *A. pseudopictus*, very common in summer, has never been seen in winter, and therefore it is inferred that it must pass that season either in the larva stage, or as an imago in dry herbage beneath the snow. Nothing is said in the summary of the methods pursued in destroying hibernating mosquitoes.

A. A.

Solotnikow (I.). Beobachtungen über *Anopheles plumbeus* Hal. in Suchum. [**Observations on *Anopheles plumbeus* at Sukhum.**]—*Nachrichten der tropischen Medizin.* Tiflis. 1929. Sept. Vol. 2. No. 7. [In Georgian script. German summary p. 553.]

At Sukhum (in Transcaucasia) the author has observed larvae of *Anopheles plumbeus* in water in flower-pots, dung-pits, and cisterns, as well as in their native treeholes. The eggs of the wintering brood are to be found in October, and the resulting imagines appear in April, the larva stages being prolonged to four months and not being discomfited when the water is frozen over. Adults are never seen in winter. Even in summer the larva stages may be protracted when the water in their treeholes becomes thick and sour from evaporation.

A. A.

Ruchadse (N.). Zur Biologie des *Anopheles Nigripes.* [**On the Biology of *Anopheles nigripes*.**]—*Nachrichten der Tropischen Medizin.* Tiflis. 1929. Vol. 2. No. 5. pp. 336–344. With 5 text figs. [In Georgian script. German summary pp. 410–411.]

This paper deals with the breeding-places, behaviour, and associations of *Anopheles plumbeus* [=*nigripes*] in Sukhum in Transcaucasia. There its larvae have been found not only in holes in trees, but also among roots of trees in shallow pools of the river and in casual receptacles of many kinds for domestic use.

A. A.

Feegrade (E. S.). **A Note on the Anopheline Fauna of a Small Tank throughout the Year.**—*Indian Med. Gaz.* 1929. May. Vol. 64. No. 5. pp. 251–252.

Four species of Anopheles—*A. fuliginosus, A. hyrcanus* var. *nigerrimus, A. barbirostris,* and *A. vagus*—were found breeding in this Rangoon tank. The names of the four species of " prawns " stated to destroy the Anopheles larvae are names of freshwater fishes ; the alternative statement, therefore, " that anopheline larvae were *not* destroyed " by prawns, may be taken as correct.

A. A.

de Meillon (B.). **Notes on Some Mosquitos found in South Africa—I.**—Reprinted from *South African Jl. of Sci.* 1928. Dec. Vol. 25. pp. 316–324. With 20 text figs. [6 refs.]

Besides some notes and figures distinguishing the larvae of *Anopheles longipalpis* and *A. marshalli* and some minor observations on 3 species of Culex, particulars of breeding-places of anophelines occurring in Johannesburg and its vicinity are given—namely, *A. mauritianus, A. pretoriensis, A. cinereus,* and *A. squamosus.*

A. A.

Collado (Juan Gil). Anofelismo en el delta del Ebro. [**Anophelism in the Delta of the Ebro.**]—*Medicina Países Cálidos.* Madrid. 1929. Sept. Vol. 2. No. 5. pp. 436–438.

Anopheles reach their maximum in July–August, the proportion to Culex being about 20 to 1. Their natural enemies are notably *Cyprinodon hispanicus, Placa minutissima* and *Notonectes glauca.* None was found infected among 200 dissected.

H. Harold Scott.

DE BUEN (Eliseo). Incompatibilidad de coexistencia entre larvas de anopheles y lemna. [**Anopheles Larvae and Duckweed Incompatible.**] —*Medicina Países Cálidos.* Madrid. 1929. May. Vol. 2. No. 3. pp. 265–269. With 1 text fig. [11 refs.] French summary pp. 269–270.

This brief summary states that duckweed (Lemna) generally grows in waters containing organic matter, and that waters in which it grows are suitable for Culex but not for Anopheles larvae.

A. A.

VIDALE (E.) & SEPULCRI (P.). Tropismi nell' ovoposizione degli anofelini. (**Tropisms in Egglaying of Anopheles.**)—*Riv. di Malariologia.* 1929. Mar.–Apr. Vol. 8. No. 2. pp. 172–175. [English summary p. 235.]

According to the summary the authors have observed both positive and negative tropisms in the parturient *Anopheles maculipennis* and *elutus*, and a remarkable positive tropism to sodium chloride manifested by *elutus*.

A. A.

KHAN (Bhupendra Mohan). **Records of Anophelines from the Bengal Dooars.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. p. 496.

Fifteen species are listed, the author having confirmed the record and added another species—*Anopheles jeyporensis*.

A. A.

IYENGAR (M. O. T.). **Adult and Larval Stages of** *Anopheles majidi*.— *Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 1–10. With 12 figs. on 1 plate & 2 text figs. [5 refs.]

Very full descriptions, with micrographs of specific features.

A. A.

MORIN (Henry G. S.). Sur la présence de *A.* (*Myzomyia*) *karwari* en Cochinchine. [*Anopheles* (*Myzomyia*) *karwari* **in Cochinchina.**]— *Bull. Soc. Path. Exot.* 1929. Apr. 10. Vol. 22. No. 4. pp. 253–255. [1 ref.] [Pasteur Inst., Saigon, Indochina.]

The occurrence of *Anopheles karwari* in Cochinchina is noted. The identity of its larva with that of *A. maculatus* is confirmed. Its debated pathogenous powers are discussed.

A. A.

EVANS (A. M.). **Notes on Certain Varieties of** *Anopheles marshalli* **Theobald.** —*Ann. Trop. Med. & Parasit.* 1929. Nov. 8. Vol. 23. No. 3. pp. 415–425. With 6 text figs. [9 refs.]

Structural features of larva, pupa, and adult male described and figured.

A. A.

SEPULCRI (Piero) & VIDALE (Enrico). Ibernamento dell'*Anopheles bifurcatus* in provincia di Venezia. (**Hibernation of** *"Anopheles bifurcatus"* **in Province of Venice.**)—*Riv. di Malariologia.* 1929. Sept.–Oct. Vol. 8. No. 5. pp. 585–589. With 2 text figs. [English summary p. 634.]

In the Venetian Province *A. bifurcatus* hibernates in the 3rd and 4th larva stages. The larva is remarkably tolerant of sudden alterations of temperature, and of asphyxia, and of prolonged shaking. The intestine was always found empty.

A. A.

Puri (I. M.). **Description of the Male, Female, Egg and Larva of** *Anopheles annandalei* **var.** *interruptus* **nov. var., with Corrections for the Previous Descriptions of the Type Species.**—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 385–396. With 6 figs. on 1 plate. [10 refs.] [Central Research Inst., Kasauli.]

Anopheles annandalei is reviewed, and a new variety *interruptus* is described, this variety being represented not only in the N.E. Himalayas and Assam but also in Ceylon. From actual comparison of the respective larvae the author pronounces Brug's *Lophoscelomyia djajasanensis* from Java to be synonymous with *Anopheles annandalei*. The minute differences between the adults of *A. annandalei*, its variety *interruptus*, and Leicester's *A. asiaticus* are tabulated.

A. A.

Puri (I. M.). **A New Tree-Hole Breeding Anopheles from South India—** *Anopheles sintoni* **sp. nov. and a Revised Description of the Larva of** *A. culiciformis* **Cogill.**—*Indian Jl. Med. Res.* 1929. Oct. Vol. 17. No. 2. pp. 397–405. With 13 figs. on 1 plate. [7 refs.] [Central Research Inst., Kasauli.]

Upon certain differences in the male genitalia and in the larva the author separates this new species from Cogill's *Anopheles culiciformis*, the adults of which resemble those of this new species " so closely as to be almost indistinguishable " from them.

A. A.

Brighenti (Dino). Contributo allo studio dell'*Anopheles sacharovi* Favr. (**Contribution to the Study of " Anopheles sacharovi " Favr.**)—*Riv. di Malariologia*. 1929. May–June. Vol. 8. No. 3. pp. 305–309. [7 refs.] [English summary p. 354.]

Breeding experiments have discovered the fact that " *Anopheles sacharovi* " is a seasonal form of *A. maculipennis*. In summer it can be recognized; in autumn and winter it resembles *maculipennis* and in winter disappears as a " species."

A. A.

Chorine (V.) & Baranoff (N.). Sur deux champignons parasites d'*Anopheles maculipennis* Mg. [**Two Fungi, Parasites of** *Anopheles maculipennis*, **Mg.**]—*C.R. Soc. Biol.* 1929. Aug. 13. Vol. 101. No. 25 pp. 1025–1026.

The authors at Zagreb observed two kinds of Saprolegniaceous fungi naturally infecting the one Anopheles, the other Simulium larvae. Experimentally, both kinds were mortal to *Anopheles maculipennis* larvae.

A. A.

Lima (A. da Costa). Sobre um novo anopheles do Brasil. [**A New Brazilian Species of Anopheles.**]—*Brasil-Medico*. 1929. Sept. 14. Vol. 43. No. 37. pp. 1100–1101. With 1 text fig. [Oswaldo Cruz Inst., Rio de Janeiro.]

The author describes, with a figure, as a new species (*Anopheles minor*) a small mosquito having considerable resemblances to *A. maculipes* and *A. apicimaculata*.

A. A.

Edwards (F. W.). **A New Anopheles from the Central Sahara.**—*Arch. Inst. Pasteur d'Algérie.* 1929. Mar. Vol. 7. No. 1. pp. 82–87. With 3 text figs. [British Museum, Natural History, London.]

A new species, *Anopheles broussesi*, " generally resembling *A. hispaniola* and *A. multicolor*," but " very distinct from both " ; breeding in small excavations of the bed of irrigation channels.

A. A.

Hecht (Otto). Die Hautreaktionen auf den Stich von *Anopheles maculipennis* (Diptera, Culicidae). [**The Reaction of the Skin to the Bite of *Anopheles maculipennis*.**]—Reprinted from *Anzeiger f. Schädlingskunde.* Vol. 5. No. 10. pp. 117–119. With 4 text figs. [Inst. for Ship & Trop. Diseases, Hamburg.]

A meticulous description of the extent and duration of the superficial appearances.

A. A.

de Buen (Eliseo). Estudio experimental de algunas substancias larvicidas antianofélicas. [**Experimental Study of Larvicides.**]—*Medicina Países Cálidos.* Madrid. 1929. Sept. & Nov. Vol. 2. Nos. 5 & 6. pp. 401–430 ; 508–540. With 19 figs. & 3 charts in text. [54 refs.] [Antimalarial Inst., Navalmoral de la Mata, Cáceres, Spain.]

This article must be consulted in the original by those interested. It is too long for abstraction in the space available. The author carried out experiments in the laboratory and in the field to test the action of measures such as liquid paraffin, Paris green and stoxal, petroleum and leron, and the use of natural enemies, on species of Gambusia. Much detail is given, but the results are in general uniformity with the findings of previous workers.

H. Harold Scott.

Blanc (Georges) & Caminopetros (J.). Quelques mots sur le mode de conservation des Stégomyias en cage. [**Notes on the Care of Stegomyia in Captivity.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. pp. 440–444. With 2 text figs. [1 ref.] [Pasteur Inst., Athens.]

For treatment of Stegomyia in prolonged captivity the author uses the ordinary wooden cage with glass front and gauze sides and sleeve, which, in order to insure a moist atmosphere, is furnished with a pair of porous earthenware vases kept full of water and plugged with absorbent cottonwool. To maintain a warm atmosphere this cage is stood in a large black box, which opens on a still larger black box containing a small gas-stove having a chimney opening to the outside. Both the enveloping box and the warming-box are furnished with large vessels kept full of water. Under these conditions the insects live happily for 10 months, laying their eggs on the feet of the vases. But they do not retain any experimental infection that they may have received.

A. A.

Roubaud (E.) & Colas-Belcour (J.). Action des diastases et des facteurs microbiens solubles sur l'éclosion des oeufs durables du moustique de la fièvre jaune. Recherches expérimentales. **Action of Ferments and Soluble Products of Microbes upon the Hatching of the Dormant Eggs of the Yellow Fever Mosquito.**—*Ann. Inst. Pasteur.* 1929. May. Vol. 43. No. 55. pp. 644–655. [4 refs.]

Roubaud (see this *Bulletin*, Vol. 25, pp. 810, 822) has distinguished two sorts of eggs yielded by the yellow fever mosquito, namely, "active eggs" that hatch quickly and spontaneously in any sort of water, and "persistent eggs" that need an incubatory stimulus. In the present paper he describes and tabulates experimental proof that the stimulus is not to be explained by osmotic differences nor by the presence of sterile organic solutions, but is readily evoked by the presence of various *active* ferments—yeast, pepsin, trypsin, papain.

A. A.

McKinley (Earl B.). **The Salivary Gland Poison of the** *Aëdes aegypti.*—*Proc. Soc. Experim. Biol. & Med.* 1929. June. Vol. 26. No. 9. pp. 806–809. [6 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

The author has taken the salivary glands from more than 2,000 females of *Aëdes aegypti* and has made several copious and potent extracts in physiological saline. Their virulence is not destroyed by freezing to − 12° C. for 5 hours, or by boiling heat for 10 minutes. As Yorke and Macfie observed, they are neither haemolytic nor coagulant. Some persons are highly and immediately susceptible to them when the injection is intradermal, though not when it is subcutaneous; others are entirely insusceptible; still others give a delayed reaction, 8 to 18 hours after injection. Though some persons —particularly dark-skins—acquire immunity, others are still susceptible after 8 to 10 successive injections. Attempts to produce a tissue immunity in a given area of skin by repeated injections and to produce an immune serum by intravenous injection into rabblts have been futile.

A. A.

Ekblom (Tore). **Some Observations on** *Stegomyia fasciata* **during a Visit to Greece in the Autumn of 1928.**—*Acta Med. Scandinavica.* 1929. Vol. 70. No. 5/6. pp. 505–518. With 6 text figs. [10 refs.] [State Bact. Inst., Stockholm.]

A summary of well-known facts, enlightened by the author's own observations in Greece during the epidemic of dengue in 1928. In a village in the Peloponnesus lying above the local limit of "Stegomyia fasciata" (900–1,000 metres) he did not find any case of dengue except in persons who had come up from infected places below.

A. A.

Huff (Clay G.). **Ovulation Requirements of** *Culex pipiens* **Linn.**—Reprinted from *Biol. Bull.* 1929. May. Vol. 56. No. 5. pp. 347–350. [4 refs.] [Med. School, Harvard Univ., Boston.]

The author draws attention to the fallacy of the assumption that a suck of blood is an essential prelude to maternity for mosquitoes.

He has fed *Culex pipiens* on raisins and haemoglobin, on yolk of egg, on potato-juice, on carrot-juice, and on apple-juice, and in every case good eggs that hatched were the sequel. In one of his numerous observations a female produced about 50 eggs within 18 hours of her emergence and without having taken food of any kind; the larvae from these eggs pupated on the fifth day of their life.

A. A.

DE BOISSEZON (P.). Remarques sur les conditions de la reproduction chez *Culex pipiens* L. pendant la période hivernale. [**Notes on the Reproduction of *Culex pipiens* L. in Winter.**]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 549–553. [3 refs.]

The author, making his interesting observations and experiments in a large cellar containing the heating apparatus of a dispensary in Toulouse, in the course of the particularly severe winter of 1928–29, gives in ample and exact detail proof of the following statements. (The cellar, be it premised, was damp, dirty water of suspicious origin had collected in places on its floor, and it was kept beautifully warm by the fire-box and chimneys of the central heating apparatus.) Under such favourable conditions it was observed that *Culex pipiens* in winter can become active and will suck blood and lay eggs, and that the larvae issuing from such eggs develop normally to the adult stage. A feed of blood, however, is not indispensable, since fertilized females were able to mature ripe eggs on a mixture of human serum and apple-juice, or even on simple apple-juice. Finally, "under favourable temperature conditions, fertilization of *Culex pipiens* can take place during winter both in freedom and in captivity."

A. A.

EDWARDS (F. W.). **Mosquito Notes.—VIII.**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 321–343. With 4 text figs.

This is descriptive entomology, and its contents are as follows: Brief diagnoses of new varieties of *Anopheles rufipes*, *A. theileri*, *A. gigas*, and *A. hyrcanus*; descriptions of new and little-known African species of Aëdes, Aëdomyia, and Culex, and of new species from Fiji; remarks on larvae and pupae of Eretmopodites and Mimomyia; and certain taxomonic questions.

A. A.

BOREL (E.) & LABERNADIE (V. G. F.). **A List of the Species of Mosquitoes collected in the French Settlements in India.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. pp. 495–496.

Separate lists of mosquitoes taken in houses or near cattle in Pondicherry, Karikal, Chandernagore, Mahé, and Yanaon.

A. A.

TAYLOR (Frank H.). **Notes on Australian Culicidae (Dipt.).**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 271–277. With 6 figs. on 1 plate. [2 refs.]

Pure entomology; 2 re-descriptions, and descriptions of 4 new species.

A. A.

Borel (E.). Les moustiques de la Cochinchine et du Sud-Annam. [**The Mosquitoes of Cochinchina and of South Annam.**]—*Arch. Insts. Pasteur d'Indochine.* 1929. Apr. No. 9. pp. 23–80. With 26 plates. [3 refs.]

This instalment of Borel's descriptive and illustrated catalogue of the mosquitoes of Cochinchina and South Annam is occupied exclusively with the Anophelines, the descriptions including the larva and both sexes of the adult of each species and synonyms without references.

A. A.

Wigglesworth (V. B.). **The Early Stages of Some West African Mosquitos.**—*Bull. Entom. Res.* 1929. May. Vol. 20. Pt. 1. pp. 59–68. With 7 text figs.

Includes description and figures of the curious breathing-trumpets of the pupa of *Hodgesia sanguinis*, each of which is cleft almost to the base to form a pair of leaflets.

A. A.

Pervassú (Antonio Gonçalves). Plantas como criadoiros de larvas de mosquitos. [**Plants as Nurseries for Mosquito Larvae.**]—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 279–282. With 6 figs. on plates.

This paper is little more than a catalogue of Brazilian mosquitoes and the trees with which they have been found associated.

H. Harold Scott.

Loughnan (W. F. M.). **Phlebotomus Flies in Mauritius.**—*Jl. Roy. Army Med. Corps.* 1929. Sept. Vol. 53. No. 3. pp. 202–205. [4 refs.]

The author makes known the discovery of Phlebotomus in Mauritius. The species is authentically identified as *P. africanus*. The first individuals were detected after a search of more than a year in December, 1928, and the number continued to increase from that time until April 1929. The flies were found in the usual places in and about buildings but a few were caught in débris among the descending roots of banyan trees.

A. A.

Dyar (Harrison G.). **The Present Knowledge of the American Species of *Phlebotomus* Rondani (Diptera, Psychodidae).**—*Amer. Jl. Hyg.* 1929. July. Vol. 10. No. 1. pp. 112–124. With 4 figs.

A critical descriptive catalogue of the presently-known American species of the genus *Phlebotomus* of Rondani, along with a tabular synopsis of distinctive specific characters.

A. A.

Sergent (Et.) & Parrot (L.). Sur l'existence de *Phlebotomus papatasi* (Scop.) et de *Phlebotomus minutus* Rondani, en rase compagne. [**Occurrence of *Phlebotomus papatasii* Scop. and *P. minutus* Rondani in Open Country.**]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. p. 544. [Pasteur Inst. of Algeria, Algiers.]

The authors, in June, in the hills of Western Biskra, found *Phlebotomus papatasii* and *P. minutus* in the burrows of desert rodents and in galleries of the bee-eater (Merops) at least 3½ miles distant from the nearest abode of man. Only adults were observed.

A. A.

Perfiliev (P. P.). Sur les phlébotomes du Turkestan et sur *Phlebotomus sergenti* var. *alexandri* Sinton. [**On *Phlebotomus sergenti* var. *alexandri* Sinton and Other Species in Turkestan.**]—*Bull. Soc. Path. Exot.* 1929. July 10. Vol. 22. No. 7. pp. 545–549. With 7 text figs. [3 refs.]

The author describes and figures *Phlebotomus sergenti* var. *alexandri* Sinton, which, along with *P. sergenti* Parrot, *P. major* var. *longiductus* Parrot, *P. papatasii* Scopoli and a species of the *P. minutus* alliance, he has collected in Turkestan.

A. A.

Bogoiawlenski (N.). Quelques observations sur la biologie de phlébotomes à Kazakh. [**Some Observations on the Biology of Phlebotomus at Kazakh (Azerbaijan).**]—*Arch. Inst. Microbiol. et Hyg. d'Azerbaidjan.* 1929. Vol. 1. No. 1–2. pp. 126–135. [In Russian. French summary p. 156.]

Achundof (I.). Die Phlebotomusfauna einiger Gegenden von Azerbaidjan. [**Species of Phlebotomus in the Republic of Azerbaijan.**]—*Ibid.* pp. 136–137. [In Russian. German summary p. 156.]

The species of Phlebotomus observed in Azerbaijan are *P. perniciosus*, *P. sergenti*, and *P. papatasii*, the first being the commonest and the last being the least abundant. [The scanty biological observations may be of local interest.]

A. A.

Legendre (J.). La zoophilie des phlébotomes en Saintonge. [**Zoophily of Phlebotomus in Saintonge.**]—*Bull. Acad. Méd.* 1929. Oct. 29. Year 93. 3rd Ser. Vol. 102. No. 34. pp. 238–240. [2 refs.]

The author dilates on the occurrence of Phlebotomus in Rochelle, Pons and other places in the Departments of Charente where the species has been identified with *P. perniciosus*. He finds that in Pons, where it is now much more abundant than it was when he first noticed it in 1923, it is attracted to fowl-houses.

A. A.

Nitzulescu (Virgil). Contribution à l'étude des phlébotomes de Roumanie. [**Phlebotomi of Romania.**]—*Ann. Parasit. Humaine et Comparée.* 1929. Sept. 1. Vol. 7. No. 5. pp. 430–437. With 5 text figs. [11 refs.] [Parasit. Lab., Faculty of Med., Bucharest.]

A prolix description, with a photograph reproduction, of a specimen of a Phlebotomus—*P. major* var. *longiductus* by designation—from Bucharest.

A. A.

Nitzulescu (Virgil). Sur quelques phlébotomes de Yougoslavie. [**Phlebotomi of Yugo-Slavia.**]—*Ann. Parasit. Humaine et Comparée.* 1929. Nov. 1. Vol. 7. No. 6. pp. 494–505. With 5 text figs. [8 refs.] [Parasit. Lab., Faculty of Med., Bucharest.]

A purely entomological paper. According to the author, the *Phlebotomus major* var. *longiductus* of Parrot is identical with Newstead's *P. chinensis*.

A. A.

Frew (J. G. H.). **Report on the Tsetse Fly Survey of Sierra Leone. September 1927-February 1929.**—16 pp. 1929. Freetown: Government Printing Office.

This survey deals with the specific distribution of the tsetse-flies in Sierra Leone. It does not go beyond the adult flies and their

attitude towards cattle, and though it is observant and discerning, and would be instructive to the prospective grazier, it contains little of medical interest that is not well known.

A. A.

CHORLEY (J. K.). **Experiments in Grass Fires against *Glossina morsitans* in Southern Rhodesia.**—*Bull. Entom. Res.* 1929. Dec. Vol. 20. Pt. 4. pp. 377–390. [4 refs.]

The operations here described were started in the month of September, when most of the grass is thoroughly dry and burns well and the increase of fly is most active. The area selected was a fairly well watered tract at an altitude of 3,500 to 3,800 feet, a mixed *Brachystegia berlinia* bush well-stocked with game It is not thought that the fire actually killed many adult flies; rather, it concentrated them along shady watercourses and in other parts where the fire was not fierce enough to destroy shade. Nor was any immediate effect noticeable on the puparia; more dead puparia were found after the fire, but this was thought to be attributable to the sun. Some concurrent observations showed that the maximum pupal term, 82 days, was for puparia collected in June (mean temperature 56° F.), and the minimum, 21 days, was for puparia collected in November (mean temperature 78° F.); that the parasites Thyridanthrax, *Syntomosphyrum glossinae* and *Stomatoceras exaratum* were present; that on an average 11 per cent. of the flies were infected with trypanosomes of the *congolense* and *vivax* groups (one specimen with *T. brucei*); and that the food of 905 flies dissected was recognizable mammal blood in 100 cases and bird blood in one case.

A. A.

CHORLEY (J. K.). **The Bionomics of *Glossina morsitans* in the Umniati Fly Belt, Southern Rhodesia, 1922-23.**—*Bull. Entom. Res.* 1929. Oct. Vol. 20. Pt. 3. pp. 279–301. With 5 text figs. [10 refs.]

The observations here discussed were made in 1923, partly in the very wet months February and March, but mainly in the dry months June to November. The fly-belt explored is about 1,500 square miles in extent and lies below the 3,000 feet contour. It is stated to have been extending, with increase of game, although it has been open to shooting since 1905. Breeding of *Glossina morsitans* is said to go on here all the year round, but most in September, and in all types of forest except the heavy evergreen jungle beside the river. Heavy thorn thickets and overgrown dongas are avoided, except in the dry season, when they are almost leafless. Most puparia were collected in open *mopane* forest when in full leaf. From 18,496 apparently alive puparia 2,304 parasites were collected—2 species of Mutilla, 5 species of Chalcidoids including Syntomosphyrum, and 1 or 2 species of the Bombyliid fly Thyridanthrax. In a table showing the weekly numbers of emergences observed in the laboratory between June 14th and November 25th, from a total of 9,223 puparia there emerged 7,440 Glossinae and—chiefly in the 3 months September–November—of *Mutilla glossinae* 1,151, of Thyridanthrax 588, of *Syntomosphorum glossinae* only 33, and of all the Chacidoids merely 11. In the week ending October 20th, 42·7 per cent. of all the emergences from the

puparia in the laboratory were *Mutilla glossinae*; and in the week ending November 10th, 64·2 per cent. were Thyridanthrax. The Mutilla does not appear to be difficult to breed for use, but all attempts to breed the Thyridanthrax in the laboratory have failed, since when confined in small jars these flies beat their wings to pieces and die in 24 hours. The Syntomosphorum is extremely easy to rear, on Sarcophagid pupae, but it cannot stand sun and cannot burrow more than 1 to ¼ of an inch, and therefore its value is limited. For other detail on the life-history and behaviour of these parasites the original paper should be consulted. The percentage of collected puparia that failed to produce either flies or parasites increased from 23 per cent. in March to 60 per cent. in November. Experiments showed that half an hour exposure to the sun (118° F.) was sufficient to kill puparia even when covered by about an inch of sand.

A. A.

Lesne (Pierre). Sur la distribution des Glossines dans la région du Zambèze de Chemba (Afrique orientale portugaise). [**Distribution of Glossina in the Chemba-Zambezi Region of Portuguese East Africa.**]—*C.R. Acad. Sci.* 1929. Dec. 30. Vol. 189. No. 27. pp. 1313–1314. With 1 text fig.

In a survey carried out at the end of the wet and beginning of the dry seasons in the Zambezi basin of that part of Portuguese East Africa which is enclosed between Nyasaland, North-East Rhodesia, and Mashonaland the author has mapped the distribution of the local tsetse-flies. Large areas there are inhabited by *Glossina morsitans*, *G. pallidipes* is abundant in Pompoué and some other places, and *G. austeni* is now for the first time observed to be sporadic.

A. A.

Austen (E. E.). **A New Tsetse-Fly of the *Glossina palpalis* Group occurring in Belgian Congo.**—*Bull. Entom. Res.* 1929. May. Vol. 20. Pt. 1. pp. 1–4. With 5 text figs.

The new species, *Glossina newsteadi*, here carefully differentiated and admirably figured in all its characteristic features, comes from the Belgian Congo and belongs to the *palpalis* group. In that group it is nearly allied to *G. pallicera* and has a close superficial resemblance to *G. caliginea*. From the *latter* it is distinguished by having, like *pallicera*, a broad fringe of fine setae along the anterior border of the third antennal segment; from the *former* by having the third antennal segment darker in its distal moiety and much less broadly fringed along the front border, and (in the male) by the much broader superior claspers and the more extensive distal narrowing of the inferior claspers. It is here represented by 6 females and 3 males from three localities in the Lower Lomami region.

A. A.

Wigglesworth (V. B.). **Digestion in the Tsetse-Fly: a Study of Structure and Function.**—*Parasitology*. 1929. Sept. Vol. 21. No. 3. pp. 288–321. With 7 figs. on 1 plate & 16 text figs. [39 refs.] [School of Hyg. & Trop. Med., London.]

This is an intent study mainly of the histology and the digestive ferments of the midgut of the tsetse-fly, and a discussion of the results.

Histologically, three regions are recognizable: an anterior region or segment, about half the total length, lined with irregularly columnar epithelium except near the middle where there is a zone of giant-cells which are packed with the "bacteroids" generally regarded as symbiotic organisms; a middle segment of large massed deep-staining cells; and a posterior segment of regularly columnar epithelium. The anatomy and histology of the three segments are described in detail, as observed in the fasting fly and as observed some hours after a feed. In the anterior segment the blood is merely concentrated by loss of fluid; no digestive ferments are found there with certainty; and, contrary to ROUBAUD'S doctrines, which are very adversely criticized both in their supposed facts and in their inferences, the present author finds no evidence that the "bacteroids" play any part in the digestion of the blood—though he speculates on the possibility of their usefulness in supplying some accessory food substance of the nature of vitamins. In the posterior segment the cells become much vacuolated in the later stages of digestion, indicative of absorption. It is in the middle segment that active digestion occurs. The author describes the changes in the ingested blood, the changes and disruptions in the epithelium, the digestive ferments detected and their strongly proteolytic character in contrast with those of Calliphora, etc. In this segment he has discovered—owing to the fact that they become injected with the ingested blood—an "amazing tangle," obviously not a true network, of tracheal capillaries breaking up in the cytoplasm of the epithelial cells. He finds that they can be made out, with difficulty, in the fasting fly, and also in Calliphora; recognizes their similitude to the tracheal capillaries of the rectal papillae; and discusses the observations of those who have thought that the tracheal system of insects may carry food as well as air.

Furthermore, the structure of the proventriculus and the origin and composition of the peritrophic membrane are very fully considered in comparison with observations of other writers, and the author confirms the statement that the peritrophic membrane, which he states is secreted afresh in whole or part at each meal, is composed mainly of chitin.

With the doubtful exception of lipase no enzymes were detected either in the proventriculus or in the salivary glands.

A. A.

AUSTEN (E. E.). **The Tsetse-Fly Parasites belonging to the Genus Thyridanthrax (Diptera.—Family Bombyliidae), with Descriptions of New Species.**—*Bull. Entom. Res.* 1929. Aug. Vol. 20. Pt. 2. pp. 151–164. With 10 text figs. [6 refs.]

"The only Dipterous parasites of tsetse-flies at present known belong to the family Bombyliidae, and to the genus Thyridanthrax, O. SACK., as enlarged by the late Professor BEZZI. Hitherto the species of this genus definitely stated in literature to be parasitic in the larval stage in *Glossina* pupae consisted solely of *Th.* (*Villa*) *lloydi* Austen, and *Th.* (*Anthrax*) *abruptus* Lw." In this paper the number of such species is raised to seven, of which three are described as new, the other four being critically reviewed, and the differential characters of all seven being conveniently contrasted in a key. "With one exception (*Th. argentifrons*, sp. n.), in which the holotype emerged from a pupa of *Glossina tachinoides* WESTW., while a paratype was bred from a pupa of *G. morsitans* WESTW. form *submorsitans* NEWST., these flies are not known to attack any species of

Glossina other than *G. morsitans*." Six out of the seven species occur either in Rhodesia or countries to the north-east or south-east; the seventh (*Th. argentifrons*) was met with in N. Nigeria.

A. A.

Dinulescu (G.). Description de la larve au premier stade du *Gastrophilus inermis* Brauer. La myiase gastrophilienne des joues chez le cheval. [**The First-Stage Larva of** *Gastrophilus inermis* Brauer: **Gastrophilus Myiasis of the Cheek in the Horse.**]—*Ann. Parasit. Humaine et Comparée.* 1929. Sept. 1. Vol. 7. No. 5. pp. 419–429. With 7 text figs. & 3 folding plates. [10 refs.] [Parasit. Lab., Faculty of Med., Paris.]

A description very liberally illustrated of the egg and first-stage larva of *Gastrophilus inermis*. The eggs are attached to the hairs of the horse's face, and the new-hatched larva bores through the chaps into the mucous membrane of the horse's mouth, where it remains until the first moult.

A. A.

Dinulescu (G.). Sur la ponte du *Gastrophilus pecorum*. [**The Parturition of** *Gastrophilus pecorum*.]—*Ann. Parasit. Humaine et Comparée.* 1929. July 1. Vol. 7. No. 4. pp. 287–289. With 2 text figs. [2 refs.] [Parasit. Lab., Faculty of Vet. Med., Bucharest, & Faculty of Med., Paris.]

Hitherto the manner of disposal of its eggs by *Gastrophilus pecorum* has been a mystery, although Hobmeyer from the colour of the eggs inferred that they were laid on the ground. In Roumania after much search the author could not find any in nature, but in the laboratory he found them adhering to nymphs of its own species in breeding cages. He therefore concludes that *G. pecorum* in nature lays its eggs on objects of any sort in the vicinity of animals.

A. A.

Martins (Agrippino). Berne ocular, myiase nasal. [**Ocular and Nasal Myiasis.**]—*Brasil-Medico.* 1929. June 29. Vol. 43. No. 26. pp. 730–732.

In San Paulo cases of larva of *Dermatobia cyaniventris* in the eyelids are not uncommon. The author mentions one in a child a year old where the larva penetrated the eyeball and destroyed the eye. Other larvae, of *Cochliomyia macellaria* ("*Lucilia hominivorax*"), often invade the nasal cavities and cause widespread destruction of tissue. The author finds local instillation of chloroform by syringe the best treatment for destroying the larvae; he has never had any accident, but he takes care to prevent the fluid entering the glottis.

H. Harold Scott.

Harris (Stevens T.). **Human Myiasis, Externa.**—*U.S. Veterans' Bureau Med. Bull.* 1929. June. Vol. 5. No. 6. pp. 412–416. [16 refs.]

The original matter here consists of brief summaries of 6 cases of myiasis—5 nasal and 1 aural—from hilly grazing country in Old Mexico. Two of the nasal cases were fatal, one by sheer malignancy, the other by the intercurrence of pneumonia. In another case recovery was delayed by the supervention of erysipelas. The maleficent

maggots are referred indiscriminately to *Cochliomyia macellaria* and *Chrysomyia*[?] *viridula*. In the treatment the following applications, direct or by spray, were found useful : a dilution of chloroform in olive oil, a 2 per cent. solution of mercurochrome, a " fly-killer " consisting apparently of pyrethrum dissolved in petroleum.

A. A.

Strickland (C.). **A Case of Myiasis of a Carious Tooth.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. p. 386. With 1 text fig.

In this case, described as unique, about a dozen maggots were extracted from a cavity in a carious upper molar tooth. The maggots are identified as *Chrysomyia bezziana*.

A. A.

Rao (G. R.). **Myiasis in Lepers.**—*Indian Med. Gaz.* 1929. July. Vol. 64. No. 7. pp. 380–382.

Three cases of myiasis are here described ; one, a nasal case, where the maggots were few and the only one that survived to the imago stage was identified as *Musca domestica* ; another, where maggots identified as *Sarcophaga* were undermining leprous ulcers on the hands and feet ; and a third, in " a particularly lazy and filthy patient " full of sores harbouring maggots, a few of which, on breeding out, were identified as Sarcophaga although the majority were *Musca domestica*.

A. A.

Porto (Gabriel). Myiase nasal e abcesso da loja temporal. [**Nasal Myiasis with Abscess in the Temporal Fossa.**]—*Brasil-Medico.* 1929. Aug. 3. Vol. 43. No. 31. p. 899.

Nasal myiasis is common enough in the author's circuit. In the present case the maggots, which were very numerous, destroyed the ethmoid and bared a part of the sphenoid bone before they were removed. A few days afterwards a swelling in the temporal region was observed, incision into which set free extremely foetid chocolate pus and was followed by violent haemorrhage. Somehow or other maggots must have got into the temporal fossa by an internal route.

A. A.

Ishikawa (S.). **A Case of Myiasis.**—*Jl. Oriental Med.* 1929. Oct. Vol. 11. No. 4. pp. 124–126. With 3 figs. on 1 plate.

This is a horrible case. The victim was a tuberculous American, age 49, whose way of life may be pictured from the statement that he drank from 1 to 2 litres (1¾ to 3½ pints) of " *pai-chu*, something like gin," every day. When brought to hospital, in Manchuria, in an appalling state, blowfly maggots (*Lucilia sericata*) " were attacking eyes, ears, nose, urinal tract, anus, and all the openings of the skin and the mucous membranes, and at the same time spreading all over the body." Though death was actually due to tuberculosis, it was much hastened in these loathsome circumstances.

A. A.

Lawson (George B.). **Myiasis.**—*Southern Med. Jl.* 1929. Nov. Vol. 22. No. 11. pp. 1003–1004. [3 refs.]

The author describes a typical case of infestation by the bot-fly maggot, *Hypoderma lineata*, in a man who had been a farm-hand—the larva, which

in the course of 3 or 4 months made a simple spiral ascent right round the trunk from the abdomen to the neck and finally worked through the cheek, was identified by Dr. C. W. Stiles.

A. A.

King (H. H.), Iyer (P. V. Seetharama), Natarajan (N.) & George (P. V.). **A Rat-Flea Survey of the Madras Presidency.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 297–334. With 4 maps.

Here are three reports forming some part of the preliminaries of a survey now in progress to determine the geographical distribution of the rat-fleas of the Madras Presidency for the purpose of distinguishing the epidemiological significance of particular species in respect of plague. They are full of detail furnishing data for a coming comprehensive summary.

1. A survey during September (the beginning of the usual plague season) of Hosur in the Salem District. Here, all the rats were the white and the brown-bellied varieties of *Mus rattus*, the latter being 75 per cent.; their fleas were *Xenopsylla brasiliensis* 63 per cent., *X. cheopis* 28 per cent., and *X. astia* 9 per cent., and the general rat-flea index was 13·6. In the houses *Pulex irritans* was abundant.

2. A survey during the usual plague season (about mid-October to about mid-January) of West Bellary District and Guntakal in Anantapur District. All rats both forms of *rattus*; their prevalent fleas *X. cheopis* and *X. astia*: *X. brasiliensis* in one town only. Total rat-flea index ranged, according to locality, between 4·2 and 11·4; *X. cheopis* index between 1·4 and 9·1, *X. astia* index between 0·02 and 7·2. An outbreak of plague was in progress in one town during this survey.

3. A survey (during the usual plague season) of Periakulam, Kambam Valley and Dindigul. Except in cotton-mills and certain insanitary villages rats were "very sparse," probably owing to methodical rat-catching in recent years. The rats were "all varieties except *M. norvegicus*"; their fleas were *X. cheopis*, *X. astia*, and *Echidnophaga gallinacea*. Total rat-flea index ranging between 5·07 and 8·18; *cheopis* index between 1·02 and 4·69; *astia* index between 2·3 and 4·87. In experiments here conducted (to estimate the preventive value of exposing merchandise to the sun) it was found that caged rats exposed (in cotton bags) to the sun's rays died in 3 hours, and their fleas in 4½ hours when the average temperature was 85° F. At an average temperature of 80° F. both the rats and the fleas could endure an all-day exposure.

A. A.

Hirst (L. Fabian) assisted by Vadivelu (K.). **The Rat-Flea Survey of Kandy.**—*Ceylon. Sessional Paper XIII.—1929.* May. 8 pp. With 1 map. 1929. Colombo.

Four species of rodents so far have been found about houses in Kandy, namely, the Ceylon variety of *Mus rattus*, the Ceylon mole-rat (*Gunomys gracilis*), the common Indian house mouse (*Mus dubius*), and the Malabar bandicoot. All are susceptible to plague, but the only important one is *Mus rattus*, and in the outbreak of plague in 1927–28, of all the 7,261 rodents trapped or otherwise destroyed in the course of five months 90·72 per cent were this species. It is essentially a domestic species in Kandy as in Colombo. Three species of fleas

have been found on the rats of Kandy, namely, *Xenopsylla cheopis*, *X. astia*, and a single specimen of a Ceratophyllus. In the course of a three-months' rat-flea survey 427 rats were searched and yielded 1,463 fleas, of which 1,018, or 69·6 per cent., were *X. cheopis*. As a point of technical interest it is recorded that of the rats accounted for by daily trapping 5,429 were caught in 829 breakback traps, and 1,449 in 102 Wonder wire traps, a rate per 100 traps that shows the latter almost exactly twice as effective as the former. A. A.

Traut (I. I.). **Fleas and Other Ectoparasites and Cohabitants of Ground-Squirrels** (*Citellus pygmaeus* **Pall.**) **and Methods of their Eradication.**—*Materials contributing to determine the Fauna of the Lower Volga Region.* Saratov. 1929. Pt. 3. pp. 53–96. With 3 figs. [23 refs.] [In Russian. English summary pp. 97–102.]

This report summarizes the results of three years' observation and experiment, concentrated upon a hectare (2·47 acres) of ground honeycombed with "hundreds or thousands" of burrows of the ground-squirrel (*Citellus pygmaeus*), with the object of discovering methods of exterminating this dangerous rodent and its noxious fleas in those inhabited parts of Central Asia where plague is endemic. Naturally, the fleas were found in strength in the burrows that contained fairly recent nests, and were fewest in summer when the ground-squirrels live and disport in the open. Apart from fleas, the burrows have a considerable fauna (more than a hundred species) of their own. This fauna includes voles and Lagomys and also the weasel, which last, although it destroys plenty of squirrels, also, like the others, spreads the squirrel-flea. Among the other commensals, ants, crickets, flies, lice, millipedes, pseudo-scorpions, spiders, ticks and woodlice are mentioned. In 7 field-working months (April–November) more than 26,000 squirrel fleas were collected, of which 70 per cent. were *Neopsylla setosa*, 15 per cent. *Ctenophthalmus pollex*, 11 per cent. *Ceratophthalmus tesquorum*, and 4 per cent. *Frontopsylla semura;* (also fifteen chance specimens collectively representing *Amphipsylla rossica*, *Ctenophthalmus orientalis*, *Ophthalmopsylla volgensis*, and *Pulex irritans*). Extermination experiments included drowning the squirrels and their fleas by flooding the burrows, and introducing various volatile poisons into the burrows, with or without subsequent plugging of the entrance. The poisons used were chlorine gas, under pressure; chloropicrine, gas, and soaked into wadding; carbon bisulphide, soaked into wadding, or exploded; and calcium cyanide in powder. Of all these substances and methods CS_2, squirted into the burrow in a 15 gm. dose and then touched with a flame and the entrance plugged, was found to be "nearly 100 per cent. effective" for destroying fleas; while the least effective was chlorine. A. A.

Ignatiev (A. K.) & Molodzova (P. F.). [Les puces des nids du spermophile (*Citellus pygmaeus*) dans la région de Tcherny Jar de l'arrondissement d'Astrakhan.] [**The Fleas of the Spermophilus** (*Citellus pygmaeus*) **Nests in Chernii Jar, Astrakhan.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1929. Vol. 8. No. 2. pp. 158–159. [In Russian. French summary p. 225.]

From 566 nests of *Citellus pygmaeus* examined during three successive springs and autumns (1926–1928) in a district of Astrakhan the author

collected 13,541 fleas—*Neopsylla setosa* 66·6, *Ctenophthalmus pollex* 26·9, *Ceratophyllus tesquorum* 9·8, and *Frontopsylla semura* 1·7 per cent. The greatest number of fleas found in a single nest, 225, was in March; the least, 15, in August.

A. A.

Swellengrebel (N. H.). **The Prevalence of** *Xenopsylla astia* **in the Netherlands Indies.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1929. Vol. 18. No. 1. pp. 151–152. [Roy. Colon. Inst., Amsterdam.]

This appears to be a personal matter. The author explains that he collected *Xenopsylla astia* in East Java in 1912 and has always since 1921 been impressed with the significance of the work of Hirst and Cragg on this species, in the hope of enlisting the interest of his class on the subject of its distribution, only desisting last year because no practical results seemed to be forthcoming from India.

A. A.

Hertig (Marshall) & Huang (Tsefang F.). **A Rat-Flea Survey of Peking.**—*Amer. Jl. Hyg.* 1929. Sept. Vol. 10. No. 2. pp. 521–525. [2 refs.] [Peking Union Med. College, Peking, China.]

This survey was pursued for a whole year and 6,286 rats were examined. The only rat-fleas found were *Xenopsylla cheopis*, 98 per cent., and *Ceratophyllus anisus*, 2 per cent. The average number of Xenopsylla per rat was 1·33 for the whole year, with a maximum of 3·10 in August and a minimum of 0·30 in February.

A. A.

Weiss (A.). Sur les puces ou aphaniptères (Siphonaptères) de la Tunisie et leurs rapports avec les hôtes qu'elles parasitent. **Fleas of Tunis and their Hosts.**]—*Arch. Inst. Pasteur de Tunis.* 1929. Nov. Vol. 18. No. 3 & 4. pp. 379–382. [10 refs.]

A list of the species known.

A. A.

Webster (W. J.). **The Anatomy of the Indian** *Xenopsylla* **Larvae.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 90–93. With 5 figs. on 1 plate. [3 refs.] [Haffkine Inst., Bombay.]

Some minor critical observations, and the statement that the classical description by Bacot and Ridewood of the anatomy of *Xenopsylla cheopis* (*Parasitology*, Vol. 7, p. 157) applies equally well to *X. astia* and *X. brasiliensis*.

A. A.

Myers (J. G.). **Facultative Blood-Sucking in Phytophagous Hemiptera.**—*Parasitology.* 1929. Nov. Vol. 21. No. 4. pp. 472–480. [27 refs.] [Imperial Bureau of Entomol., London.]

It is well known to naturalists that many kinds of bugs whose normal nourishment is sap of plants may casually "bite" a man. In this discourse the subject is introduced and to some extent reviewed; a classified list of phytophagous Hemiptera recorded as attacking vertebrates and other animals is given; the author describes his observations (and his own painful experiences) of the behaviour of a plant bug that sucked his blood for an hour, and speculates on the

circumstances that distract an individual bug from its natural food; some alleged pathological effects of such bug-bites are mentioned; and a list of references is appended.

A. A.

Talice (R. V.). Parasitisme de *Triatoma rubrovaria* par un sporozoaire. [**A Sporozoon Parasite of** *Triatoma rubrovaria*.]—*Ann. Parasit. Humaine et Comparée.* 1929. July 1. Vol. 7. No. 4. pp. 257–261. With 1 text fig. [15 refs.] [Parasit. Lab., Faculty of Med., Paris.]

Not far from the town of Uruguay, among the boulders of a rocky declivity—a barren spot inhospitable to large wild creatures and considerably distant from the haunts of man and domestic animals—the author came upon a company of twenty young and adolescent individuals of the Reduviid bug *Triatoma rubrovaria*, some of which had a stomach half-full of nucleated red blood, traceable to the little fork-tongue lizard, *Teius teju*, a local cohabitant of the rocks. In the dejections of the bugs, metacyclic forms of *Trypanosoma cruzi* were discovered (their identity being stamped by inoculation upon rats). Also in one individual nymph a cyst containing sporozoites of a haemogregarine was found in the intestinal wall. From the facts related the author thinks that *Teius teju* must be the vertebrate host of this haemogregarine.

A. A.

Wigglesworth (V. B.). **Observations on the "Furau" (Cicindelidae) of Northern Nigeria.**—*Bull. Entom. Res.* 1929. Dec. Vol. 20. Pt. 4. pp. 403–406. With 1 text fig. [6 refs.] [School of Hyg. & Trop. Med., London.]

It is here shown that the West African story of the "Fura" (larva of a Tiger-beetle) biting the feet of persons who tread on its burrow, and thereby causing the inflammatory lesions known as "furau," is of imagination all compact. The author shows by experiment that the bite has no hurtful effect upon the skin of monkey or of man, and that the digestive fluid which it spews over its prey is quite innocuous although it has strongly proteolytic properties. The natives, however, regard this grim-visaged hump-backed creature with terror.

A. A.

Pawlowsky (E. N.) & Stein (A. K.). Experimentelle Untersuchung über die Wirkung der, eine eigenartige Dermatitis beim Menschen hervorrufenden, Milbe *Rhyzoglyphus* (*sic*) *hyacinthi* (Fam. Tyroglyphidae). [**Dermatitis Experimentally Produced in Man by means of the Tyroglyphid Mite** (*Rhizoglyphus hyacinthi*.]—*Arch. f. Dermat. u. Syph.* 1929. Sept. 18. Vol. 158. No. 2. pp. 443–449. With 4 text figs. [Military Med. Acad., & State Inst. for Med. Science, Leningrad.]

The authors describe in minute and overflowing detail their experimental production of a superficial itchy dermatitis in man by means of the well-known destructive bulb-mite *Rhizoglyphus hyacinthi*, a species closely related to the cheese-mite family (Tyroglyphidae).

When the crushed mites from infested onions were rubbed into, or merely left in contact with, the human skin there very soon followed itching, reddening, and transient papulation. No actual cases are mentioned of itch naturally acquired; but the authors build on the fact that, in 1910, *Rhizoglyphus parasiticus* of Dalgetty was found in a skin eruption observed on Indian tea-plantations.

A. A.

Metzler. Gastro-entéropathie avec présence dans les selles d'un acarien de la sous-famille des Tyroglyphines. [**Gastro-Enteritis associated with Tyroglyphine Mites in the Stools.**]—*Bull. Méd. du Katanga.* 1929. Vol. 6. No. 2. pp. 64–65.

A case of colic and diarrhoea with nausea and intense pruritus ani, in a European. The only organism found in the stools was the common mite, *Tyroglyphus longior*. Since the diarrhoea yielded to ordinary treatment the author does not lay that item to the charge against the mite.

A. A.

Talice (R. V.). Sur quelques larves de *Trombidinae* de l'Uruguay, parasites des animaux. [**Larvae of Uruguayan Trombidinae that parasite Animals.**]—*Ann. Parasit. Humaine et Comparée.* 1929. Nov. 1. Vol. 7. No. 6. pp. 481–493. With 5 text figs. [18 refs.] [Parasit. Lab., Faculty of Med., Paris.]

The manner in which Trombicula larvae attach themselves to the host and suck its blood is here studied by means of sections of the host's skin and the larvae attached to it.

A. A.

Foley (H.) & Parrot (L.). Sur l'existence d'*Ornithodorus marocanus* Velu en Algérie (Sud-Oranais). [**On the Occurrence of** *Ornithodorus marocanus* **Velu in Algeria.**]—*Bull. Soc. Path. Exot.* 1929. June 12. Vol. 22. No. 6. p. 436. [Pasteur Inst. of Algeria, Algiers.]

Sergent (Et.) & Parrot (L.). Sur la répartition géographique de *Ornithodorus marocanus* Velu en Algérie. [**On the Geographical Range of** *Ornithodorus marocanus* **Velu in Algeria.**]—*Ibid.* pp. 436–437. [Pastéur Inst. of Algeria, Algiers.]

The information combined in these papers is that *Ornithodorus marocanus* has been found in southern, eastern, and western Algeria in burrows of the gerbille and the jumping-mouse—those typical desert animals, and that it sucks the blood not only of mammals, but also of toads that shelter in the burrows.

A. A.

Pawlowsky (E. N.) & Chodukin (N. J.). Ueber die Antikoaguline und andere wirksame Bestandteile der Zecke *Ornithodorus papillipes* Bir. [**Anticoagulin and Other Active Properties of** *Ornithodorus papillipes* **Bir.**]—*Ztschr. f. Parasitenk.* 1929. June 17. Vol. 2. No. 1. pp. 90–96. [10 refs.] [Military Med. Acad., Leningrad.]

Observations showing that the salivary glands in both sexes of *Ornithodorus papillipes* secrete an anticoagulin, which strongly haemolyses human

blood and quickly agglutinates the red cells. The gut of this tick also produces anticoagulin. During the act of suction the coxal glands do not pass their secretion.

A. A.

Colas-Belcour (Jacques). Sur l'identité d'*Ornithodorus erraticus* Lucas et d'*Ornithodorus marocanus* Vélu. [**Identity of** *Ornithodorus erraticus* **Lucas and** *Ornithodorus marocanus* **Vélu.**]—*C.R. Acad. Sci.* 1929. Dec. 30. Vol. 189. No. 27. pp. 1316–1318. [4 refs.]

By careful comparative study the author decides that *Ornithodorus marocanus* described by Vélu in 1919 is identical with *Ornithodorus erraticus* described by Lucas, in 1849, in his *Exploration scientifique de l'Algérie* (*Zoologie*, Fasc. 1, p. 316).

A. A.

Colas-Belcour (Jacques). Présence d'*Ornithodorus coniceps* en Tunisie. [*Ornithodorus coniceps* **in Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1929. Nov. Vol. 18. No. 3 & 4. pp. 265–267. [8 refs.]

Note of the finding of a larva of this species (formerly regarded as a variety of *O. talaje*) on a bat in a Tunis granary.

A. A.

Franchini (G.). Distribuzione delle "Ixodoidea" nelle Colonie Italiane—Tripolitania. [**The Distribution of Ixodoidea in Tripolitania.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Feb. 1. Vol. 10. No. 2. pp. 49–51. With 1 fig. English summary p. 52. [Inst. of Trop. Path., Univ., Bologna.]

The local provenance, in Tripolitania, of 7 species of ticks, most of them widely distributed species, is graphically illustrated.

A. A.

Franchini (Giuseppe). Distribuzione degli Ixododi (Ixodoidea) nelle nostre Colonie. Somalia (Oltre Giuba compreso). [**Distribution of Ixodide Ticks in Somalia.**]—*Arch. Ital. Sci. Med. Colon.* 1929. Mar. 1. Vol. 10. No. 3. pp. 131–135. With 1 fig. English summary p. 135. [Inst. of Trop. Path., Univ., Bologna.]

A list of 29 species of ticks, with their local distribution, in Italian Somaliland.

A. A.

Smith (R. O. A.). **Two Species of** *Culicoides* **which feed on Man.**—*Indian Jl. Med. Res.* 1929. July. Vol. 17. No. 1. pp. 255–258. With 6 figs. on 1 plate.

Two species *C. actoni* and *C. raripalpis* from Assam described as new.

A. A.

LEPROSY.

COCHRANE (Robert G.). **Leprosy in the Far East.** With a Foreword by Sir Edward A. GAIT, K.C.S.I., C.I.E.—67 pp. British Empire Leprosy Relief Association, 29 Dorset Square, London, N.W. 1. 1929. World Dominion Press, 1 Tudor Street, E.C. 4. [2s.]

This is the third part of a world survey. It contains much interesting information including the following points. In Japan in 1925 the Government estimated 15,351 lepers, about 3,000 of whom are in five Government and seven private institutions, but some authorities have estimated the real number at 50,000 or over. A Japanese Leprosy Prevention Association is to be formed.

In Formosa the lepers have been estimated at 4,000 and only one institution, a mission hospital, is treating cases.

In Korea the numbers have been estimated at 20,000, mostly in the south, but the Government census shows only 4,641. Four leper homes, with about 2,000 inmates, are at work, and remarkable success has been obtained with the modern treatment at both Fusan and by Dr. WILSON at his recently transferred Roonchun colony.

The section on leprosy in China is by Dr. Henry FOWLER, who has long experience in that country. The true number of lepers is quite unknown, but the Kwantung and the other maritime provinces are most affected. The whole of the work for lepers is undertaken by missions, but it is greatly handicapped by the unsettled state of the country. In Kwantung some 600 lepers are cared for, but much smaller numbers or none at all in the other provinces. Ill-drained areas suffer most and large tracts of the interior and north have few cases, but the aboriginal tribes seem to be very susceptible. It is hoped that the recently established Chinese Mission to Lepers will improve the present very unsatisfactory conditions.

In the Philippines the incidence is estimated at 10,000, or 1 per mille. The well-known work of the Americans at Culion is mentioned and the success of the modern treatment there, and still more in the recently established treatment hospitals near large towns, in permitting over 1,000 releases is emphasized.

In the Dutch East Indies, 4,300 lepers are segregated in 43 homes, and the total number is unknown, but has been estimated at fifty to sixty thousand.

In British North Borneo the lepers are estimated at 500 to 1,000; only 50, mostly Chinese, are segregated. The disease is largely due to Chinese immigrants, and it is suggested that closer supervision at the time of their entry would reduce the prevalence of the disease.

In the Federated Malay States and the Straits Settlements Chinese are most affected, but the indigenous races also have a number of cases and the total number is unknown. Some 1,200 are segregated in three well-known colonies.

In French Indo-China the number of lepers is estimated at 30,000 and 5,994 are interned in leper villages with attached hospitals.

In Siam leprosy is very prevalent, and in 1920 8,457, or about 1 per mille, were enumerated, but the real number has been variously estimated at from 20,000 to 50,000. The enlightened ruling family help to support leper institutions, the two best of which have 550

inmates. Mission hospital out-patient treatment with a leper home has enabled 400 lepers to be treated in the north.

Prophylaxis.—Throughout this publication the necessity of attracting the early cases to come to colonies or hospitals for treatment, if any real progress is to be made in reducing leprosy, is emphasized, and the disadvantages of rigid compulsory segregation methods in causing such early amenable cases to be hidden until no longer favourable for treatment is insisted on.

L. Rogers.

Far Eastern Association of Tropical Medicine. Transactions of the Seventh Congress, British India, 1927. Vol. 2. pp. 305–393. [**14 Papers on Leprosy.**]

As usual with congress papers, this series deals chiefly with previously published work already dealt with in this *Bulletin*, so they can be reviewed briefly. K. Raman Tampi shows by a map that in the Travancore State, in the extreme south-west of India, the damp coastal areas show most leprosy. The 2,058 known lepers give an incidence double that of India as a whole ; the northern division has most rainfall and most lepers. R. Row reports further cases treated with his tubercle bacillus autolysate with considerable improvement, illustrated by photos, and D. D. Kamat and V. Y. Randive report promising results with both Row's vaccine and with chaulmoogra oil preparations. E. Muir deals once more with the iodide treatment controlled by the sedimentation test, and also with the leprosy reaction and its treatment by antimony intravenously, and J. M. Henderson points out that these reactions cause a temporary leucocytosis, accompanied by a fall in the lipase content of the blood in the later stages of the reaction (as first pointed out by Rogers) and an acceleration of the sedimentation rate, the latter lasting longer than the leucocyte increase. Muir also advocates the use of iodides in making a diagnosis of clinically doubtful cases, as a prophylactic in contacts with lepers and in testing the reality of clinical cures. Drs. H. W. Wade and E. V. Pineda, of the Philippines, contribute short papers on tuberculoid skin lesions and on the presence of the lepra bacillus in the placenta respectively.

Prophylaxis is dealt with by Muir by means of the propaganda-treatment survey centres, which he advocates to enable leprosy to be stamped out of highly endemic areas such as west Bengal and east Bihar, where he organized this plan, with the result that within three weeks of opening a dispensary 300 leprosy patients, many in the early amenable stages, were attending from villages within a 10 to 15 mile radius. He points out that as compared with very expensive leper asylums this is a comparatively inexpensive way of reducing leprosy, as regards both capital and annual cost, by making full use of the improved treatment now available. In contrast with Muir's plan we have a paper by R. S. Donaldson, who is in charge of the Lady Willingdon Leper Settlement of South India with accommodation for 480 lepers, mostly advanced cases unsuitable for treatment, and he points out that few stay long enough to benefit much, as shown by the fact that there were 916 admissions and 760 discharges in the year.

L. R.

LEPROSY NOTES. 1929. Oct. No. 7. 32 pp. Issued Quarterly by the British Empire Leprosy Relief Association, 24 Cavendish Square, W. 1.

LEPROSY REVIEW. 1930. Jan. Vol. 1. No. 1. pp. 1–32. Quarterly Publication of the British Empire Leprosy Relief Association. 29 Dorset Square, London, N.W. 1.

The October number of "Leprosy Notes" includes information on the disease in China, Japan and Canada and Burma. In the last Dr. P. M. C. PEACOCK, who has run a leprosy out-patient clinic in Mandalay for some years, largely at his own expense, records the great value of visiting the houses of the patients, as shown by three instances in which two more early cases were found in each by such visits. In this way early cases may be obtained and cleared up by treatment without isolation and thus prevented from going on to the infective stage. [This plan was advocated in "Leprosy" several years ago.] At Weihaiwei in North China Dr. Francis CLARK has carried the treatment to lepers in surrounding villages with the aid of a motor bicycle with beneficial results. Dr. James L. MAXWELL, with long experience in China, urges that any attempt at compulsory segregation in that country is doomed to failure, but extended treatment of early cases is urgently needed. R. G. COCHRANE writes on iodides in leprosy and points out how easy it is to do harm with this powerful drug. He warns against the method being used as a routine one and urges those without much experience to avoid the use of the drug. J. D. PAGE deals with the history of leprosy in Canada and the Tracardie Lazaretto of New Brunswick; he records that in the last ten years eleven patients have been admitted from six different provinces of Canada, and 20 cases are known. He urges that the early diagnosis should be taught in medical schools.

The January issue of this quarterly has appeared in a slightly enlarged form under the title of "Leprosy Review," but with similar scope, to enable the increasing number of articles to be accommodated, under the editorship of Dr. Robert G. COCHRANE, the Secretary of the British Empire Leprosy Relief Association, who contributes an article on Prognosis in Leprosy. Ocular leprosy is dealt with by H. KIRKPATRICK and by P. HOWELL, the Kahn reaction by R. L. KAHN, the pathological changes of the nervous system by H. P. LIE of Norway, industrial therapy by R. M. WILSON of Korea, who built a new model leper settlement by the labour of the lepers themselves, and Henry FOWLER deals with leprosy in Korea; making altogether a useful start for the review in its new form.

L. R.

CARMOUZE. Fréquence et prophylaxie de la lèpre en Guyane française. [**Frequency and Prophylaxis of Leprosy in French Guiana.**]—*Sciencia Med.* 1929. Aug. Vol. 7. No. 8. pp. 392–394.

In the Cayenne area 350 lepers have been recognized in the last five years by the Institute of Hygiene, which forms a clinic for regular treatment, and 140 more are isolated elsewhere. Hyrganol injections are used, but the results have not been very great, so he thinks treatment should be obligatory and should be improved to make it more rapid and effective.

L. R.

González (Eudoro). Datos para el estudio de la distribución y profilaxia de la lepra en Venezuela. [**The Distribution and Prophylaxis of Leprosy in Venezuela.**]—*Gac. Méd. de Caracas.* 1929. (25° Aniv. Acad. Nac. de Med. Numero extraord.) pp. 9–15.

Two districts only are dealt with, La Providencia in which the registered lepers in April 1929 numbered 542 (373 males and 169 females), and Cabo Blanco 271 (154 males and 117 females). The total in Venezuela is not known, but the number is certainly increasing.

In the districts named antileprol is used for treatment, and in La Providencia, of 226 patients treated by intravenous or intramuscular injection, 160 or 66·37 per cent. have improved, and 30·98 per cent. have remained in the same condition. In Cabo Blanco 195 have received the treatment, 72 intravenously, 123 intramuscularly. The results of these injections are to be published later.

H. Harold Scott.

Guerrero (G. Rodriguez). Enquête sur la lèpre en Uruguay. Quelques vues sur la prophylaxie. [**Leprosy in Uruguay.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1929. Nov. Vol. 51. No. 11. pp. 818–833. [6 refs.]

The writer sent a questionary repeatedly to all the doctors in Uruguay, and eventually obtained replies from 95 per cent. of them. From these he concluded that the total maximum number of cases is 350, or 0·19 per mille. The nerve forms were 56 per cent., the nodular 16 and mixed cases 28 per cent. Monte Video showed by far the largest numbers, the coastal area more than in the interior, and some imported cases were met with. The great majority received no treatment, although treatment is the best prophylactic measure at present. He advises the Norway humane system of isolation with home isolation when suitable, combined with regular modern treatment and the medical supervision of all family contacts. Notification of all cases should be enforced.

L. R.

Medeiros (Luiz). Contribuição á epidemiologia da lepra no Paraná. [**Leprosy in Paraná.**]—*Archivos de Hyg.* Rio de Janeiro. 1929. Sept. Vol. 3. No. 2. pp. 265–278. [1 ref.]

Souza Araujo in 1919 reported that the number of lepers in Paraná in 23 districts was 380. In 1926 the São Roque Leprosarium was inaugurated and it is calculated that there are now nearly 700 in the entire State, of which 417 have been registered. No less than 270 of these are farm labourers. Regarding sex distribution, 280 are adult males, 115 women; 22 are children. The vast majority developed the disease between the ages of ten and forty years; of 370 of whom the ages were ascertained, 91 acquired infection in the second decade, 109 in the third and 96 in the fourth. 268, or 64·3 per cent., had the definitely nodular form, while another 39 exhibited the same in an early stage; 68, or 16·3 per cent., the nervous form, and 42, or 10 per cent., the mixed.

H. Harold Scott.

Fontes (Pedro). A lepra no Estado do Espirito Santo. [**Leprosy in Espirito Santo.**]—*Folha Med.* 1929. Dec. 15. Vol. 10. No. 35. pp. 430–431.

The Leprosy Preventive Service in the State of Espirito Santo, Brazil, had noted in August 1927 that there were 30 cases of this disease. At the request of Dr. Araujo the author made a detailed investigation in each of the towns and villages, consulting at the same time the local medical men. He found 180 cases, many of which were proved by bacterial examination. The majority were found on the frontiers between Minas and Rio respectively and he believes that many are cases imported from neighbouring States.

H. Harold Scott.

Medulla (Candido). Casi di lebbra in Cirenaica. Contributo alla casistica ed all' epidemiologia. [**Leprosy in Cyrenaica.**]—13 pp. [18 refs.] 1928. Bengasi. [Cyrenaica: Ospedale Coloniale di Bengasi.]

During the years 1905–11 cases of leprosy were fairly common in Cyrenaica; 81 were noted in Benghazi. In 1926 only four cases could be found, and seeing that two of these have died and the others have left the district, the author believes that Cyrenaica is now free of the disease.

H. Harold Scott.

Bulletin Office International d'Hygiène Publique. 1929. Sept. Vol. 21. No. 9. pp. 1559–1560.—La lèpre en Norvège au cours des années 1910 à 1925. [**Leprosy in Norway, 1910 to 1925.**]

At the end of 1925 the lepers in Norway had become reduced to 107 from 160 in 1920, or by 67 per cent. 72 remain in the Bergen leper institution. A table of the distribution in Norway is given.

L. R.

Paldrock (A.). **Some Observations upon Leprosy in Estonia and its Treatment.**—*Amer. Jl. Trop. Med.* 1929. Nov. Vol. 9. No. 6. pp. 445–460. With 5 figs. [16 refs.]

In this note the author's well-known views are repeated once more. He claims that the local application of carbonic acid snow to lepra nodules is a "specific" treatment, although he admits that after a time no further progress results, and he then resorts to injection of the gold preparation, solganol. He states that there are now 236 known lepers in Estonia, and he thinks the numbers are stationary.

L. R.

Weidemann (M.) & Kaktin (A.). Ueber die Verteilung der Blutgruppen bei Leprösen in Lettland. [**Distribution of Blood Groups among Lepers in Latvia.**]—*Med. Klin.* 1929. May 10. Vol. 25. No. 19 (1274). pp. 751–752. [4 refs.] [Inst. of Forensic Med. & Path. Anat., Latvian Univ., Riga.]

The blood groups of lepers in Latvia have been investigated in the hope of throwing light on the question whether this factor influences

the predisposition to leprosy in certain races and their infectivity. For this purpose 106 lepers have been studied in a Riga asylum, with 37 per cent. of O group, 34 per cent. of A, 17 per cent. of B, and 9 per cent. of AB. On comparing these data with those of 1,160 non-leprous persons very little difference was found except that the B group was rather more frequent than in the leprous series. Leprosy is more common among the original inhabitants of Livonia and among the Finns, whose blood grouping is very similar, but other races living in close proximity to them remain more or less immune, so the authors think that there is some racial predisposition to leprosy. They conclude, however, that there is no definite relationship between this predisposition and the blood grouping of the different races.

L. R.

i. Kirschfeld (E. P.). Les " kischlaks " des lépreux dans la circonférence Sourhan Dharyine en Ouzbékistan. [**Lepers in S. Russia.**]—*Russian Jl. Trop. Med.* 1929. Vol. 7. No. 5. pp. 342–348. [In Russian. French summary pp. 348–349.]

ii. ——. Les villages d'isolation des lépreux—Kichlak-Makhaou—à Ura-Tube dans le Tadgikistan.—*Ibid.* No. 7. pp. 487–489. [2 refs.] [In Russian. French summary pp. 489–490.]

i. In the first of these notes the author records a visit to a colony containing 3 lepers with 21 cases of vitiligo and 8 other persons, owing to the people not distinguishing nerve leprosy from vitiligo. The people all lived by begging.

ii. In the second note he deals with the disease at Bokhara, where he found 3 lepers, 3 vitiligo cases and 8 healthy persons in a village. He advises medical examination of suspected lepers and isolation of true cases.

L. R.

Brennan (C. H.). **An Account of a Leper Lazaretto.**—*Kenya & East African Med. Jl.* 1929. Nov. Vol. 6. No. 8. pp. 233–235.

During 1928 the leper camp at Kakamega, North Kavirondo, with about 50 lepers, was not very satisfactory, but huts were built, with a dispensary and small hospital. The increased comfort resulting caused the number of voluntary inmates, for no compulsion is attempted, to increase to over 100; each occupant of a hut has a strip of ground which he cultivates, so that the majority of the lepers will soon be self-supporting as regards food.

L. R.

Blanchard (R. M.). **A Day at Kalaupapa.**—*Milit. Surgeon.* 1929. Sept. Vol. 65. No. 3. pp. 379–386. With 2 figs.

The author accompanied the annual visit of Hawaii authorities to the famous Molokai leper settlement; he gives an interesting account of his experience. He found Brother Joseph Dutton, one of Father Damien's colleagues, quite well after 43 years' work among the lepers. A government institution built twenty years ago for the study of leprosy remains unused, and only about one-tenth of the patients, who are advanced ones, attend for treatment. The disease is decreasing in Hawaiian territory. The more favourable cases are treated at the Kalihi leper hospital near Honolulu with good results in the less advanced ones, only hopeless cases being sent to Molokai, where they live under natural conditions in their own houses and appear to be fairly contented and well cared for.

L. R.

ROGERS (Leonard). **Recent Advances in the Treatment and Prophylaxis of Leprosy.**—*Edinburgh Med. Jl.* 1930. Jan. Vol. 37. No. 1. pp. 1–27. [88 refs.]

This is the Carmicheal Prize Lecture delivered before the Edinburgh University. It contains the history of the recent advances in treatment, and emphasizes that the power we now possess to clear up the majority of the early cases of leprosy renders obsolete the old Middle Ages rigid compulsory segregation, which causes the early amenable cases to be hidden until they have become infectious and much less curable. It should therefore be modified by allowing early cases to be treated at clinics, hospitals and by private practitioners. The extensive bibliography should be useful to students of leprosy.

L. R.

HUIZINGA (Lee S.). Nieuwe bijdrage tot de kennis van het vraagstuk der lepra. [**New Work on Leprosy.**]—*Nederl. Tijdschr. v. Geneesk.* 1930. Jan. 11. 74th Year. 1st Half. No. 2. pp. 136–140. [9 refs.]

Our knowledge of leprosy has advanced but little except in regard to its treatment. A peculiarity of the Mycobacterium group to which the leprosy bacillus, along with the tubercle, smegma and butter bacilli, belongs, is its polymorphism. Branched forms occur and forms which are intermediate between the ordinary bacteria and filamentous organisms. It is remarkable what numbers of bacilli can be found in the body and that survival should be possible under such circumstances. Some workers have been able to produce localized leprous lesions in apes, but this is not true leprosy, for the bacilli are not found in pure culture in such lesions. Cultivation of the leprosy bacillus has not, until recent times, been successful, but claims have now been put forward that this has been accomplished. Intrauterine transmission of leprosy has been demonstrated. It has been asserted that the Wassermann reaction is negative in leprosy, but more controlled observations are necessary on this point. The calcium content of the blood serum of the leper is normal and there is no relation between this and absorption of bone. Rat leprosy is an interesting condition and has formed the basis of many experiments. It is not the same as human leprosy. The prolonged incubation period of leprosy would seem to point to the possibility of the bacillus remaining latent after infection has taken place or to its growing so slowly that years elapse before symptoms arise. We must bear in mind the possibility of the existence of various phases in the life-cycle of the bacillus, only one of which may be causative of human leprosy. Leprosy affects mainly the skin, nerves and superficial lymph glands. Nerves show thickenings and the skin shows nodules. Trophic ulcers, due to nerve affections, furnish no bacilli, whereas the exudate from ulcers developing as a result of perforation of subcutaneous lepromata contains countless leprosy organisms. The characteristic lepra cells are probably endothelial leucocytes or macrophages which have phagocytosed the organisms but exert upon them little or no bactericidal action. Ophthalmologists estimate that 25 to 80 per cent. of lepers suffer from eye affections of one kind or another. Lepers appear to be immune to infection by pyogenic organisms. It is very essential that laboratory work on the subject should be supplemented by epidemiological investigation.

W. F. Harvey.

Huizenga (Lee S.). **Scientific Advances in the Study of Leprosy.**—*Nat. Med. Jl. China.* 1929. Aug. Vol. 15. No. 4. pp. 443–452. [11 refs.]

This is a lecture on recent advances in leprosy in which the fact is emphasized that the great improvement in treatment during the last fifteen years has resulted in the old leprosaria, where "the dead still living" were collected, being converted into hospitals where the list of paroled and discharged as cured is increasing day by day.

L. R.

Muir (E.). **The Infectiousness of Leprosy.**—*Indian Med. Gaz.* 1929. Nov. Vol. 64. No. 11. pp. 620–623. [School of Trop. Med. & Hyg., Calcutta.]

After a brief discussion of the mode of infection in leprosy through prolonged close contact with an infectious case, the author points out that Bengal surveys show that villages with a single caste are least affected, but those with promiscuous intercourse of various kinds due to the presence of various castes mixed together have most cases. He next discusses the infectiousness of different types, the dermal active nodular B2 being the most dangerous through discharge of lepra bacilli from the nose, but even dermal cases with negative nasal discharge are very slightly infective. In early nerve cases the chances are not a billion to one that the bacilli will escape through the skin to cause infection, so the danger is absolutely negligible.

These facts have not been sufficiently taken into account in the older forms of prophylaxis, under which many uninfective cases have been segregated, and this measure and ostracizing bacteriologically negative lepers only leads to the early, more easily curable, cases being hidden until they have become infectious and difficult to cure. He therefore advises only the really infective cases being made to leave their employment, while the rest should continue their work, but attend regularly for out-patient treatment.

L. R.

Lampe (P. H. J.). Het lot van de in een melaatscheninrichting uit melaatsche ouders geboren kinderen. [**The Fate of Children from Leprous Parents born in a Leper Asylum.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Oct. 1. Vol. 69. No. 10. pp. 994–1006. With 1 fig. & 1 chart on 2 plates. [1 ref.]

The author found no difference between the fertility coefficient of the normal and the leprous woman in Surinam (6·3 against 7·3). The high infant mortality of the children born in the asylum is probably in great part due to complicating parental syphilis. Of the remaining children, who are evacuated before the age of 1 year, in the course of time 26 per cent. get leprosy, but as only about 1·5 of them show signs of the disease before the age of 5, it is probable that most of the others are infected outside the asylum. In order to prevent as much as possible the infection of children born in a leper asylum it is necessary to evacuate them immediately after birth and to bring them up in surroundings free from leprosy. Certainty about such freedom practically never exists if the children return to the conditions in which their leprous parents lived.

W. J. Bais.

Wayson (N. E.) & Badger (L. F.). **Studies upon Leprosy. XLIX. Clinical Observations of "Early" or Moderately Advanced Cases.** —*Public Health Bull. No. 189.* Washington. 1929. Sept. 16 pp. [2 refs.]

This interesting detailed account is difficult to summarize. The authors mention that leprous symptoms may first break out during pregnancy or lactation or at puberty. Most cases are of more than two years' duration on admission to hospital. The familiar early nerve and skin signs are well described, and the tendency to symmetry of the skin lesions is pointed out. Definite lesions were found most frequently on the legs, face, arms, buttocks, back, ears, chest and abdomen in that order, and most rarely on the palms, male genitals, groin and axilla. Some loss of the eyebrows occured in 10 to 15 per cent. In 98 per cent. of nerve symptoms evidence of peripheral neuritis occurred, and muscular paresis occurred predominantly in the hand muscles and next most often in the facial muscles. The febrile attacks are described. An analysis of cases released five years or more previously showed 100 relapses among 223 cases, 87 of whom were bacteriologically positive on admission and only 13 negative. In positive cases the lepra bacilli were demonstrated in 90 per cent. by skin snipping.

L. R.

Tisseuil (J.). Forme familiale de la lèpre. [**Familial Form of Leprosy.**] —*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 631–633.

The author points out that when two or more cases of leprosy occur in one family they are commonly all of the same type, either both dermal or both nerve cases, and he illustrates this by 8 series of cases. He has also noted a predominance of one type in certain indigenous tribes.

L. R.

de Castro (A. Martins) & Gomes (L. Salles). Bacillémie lépreuse pendant une poussée fébrile au cours du traitement d'une lèpre ancienne. [**Leprous Bacillaemia during a Febrile Attack in Treatment of an Old Case.**]—*Bull. Soc. Française Dermat. et Syph.* 1929. Nov. No. 8. pp. 1082–1086. With 2 text figs. [4 refs.]

A case is recorded in which during a twelve-day febrile reaction numerous lepra bacilli were found in the blood from the veins, and especially from that of a finger without evident lesions. Cultures and inoculations into rats and guineapigs were negative.

L. R.

Eubanas (Froilan). **Plantar and Palmar Manifestation in Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1929. Oct. Vol. 9. No. 10. pp. 358–360.

The author quotes Hansen and Loft and other old writers regarding the rarity of leprous nodules on the plantar and palmar surfaces, and he reports a case with lesions in each of these positions proved to be bacteriologically positive. [Fig. 38 of "Leprosy" illustrates nodular leprosy of the palm in a case of E. Muir.]

L. R.

Barrera (F. de P.) & Peña Chavarria (A.). Manifestaciones agudas de la lepra. [**Acute Manifestations of Leprosy.**]—Reprinted from *Rev. Méd. Latino-Americana.* 1927. Mar. Vol. 12. No. 138. 33 pp. With 9 text figs. & 4 graphs. [13 refs.] French summary p. 34.

The authors deal with the familiar acute exacerbations of nodular leprosy more particularly. They agree with other writers that they are accompanied by degeneration of the lepra bacilli and are often followed by great improvement for a time, but the patients are highly infective in this stage owing to the great elimination of lepra bacilli in the process.

L. R.

Lara (C. B.) & Nicolas (C.). **Efficacy of the Plancha, or Infiltration, Method of Treatment in Early Cases of Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1929. Sept. Vol. 9. No. 9. pp. 321–326. [8 refs.] [Med. Section, Culion Leper Colony, Philipppine Is.]

Velasco (Felix I.), Alonso (José M.), Limkako (Gabino) & Fernandez (Guillermo) assisted by Del Rosario (F. T.). **Treatment of the Chief Types of Cutaneous Lesions in Leprosy by the Plancha, or Infiltration, Method.**—*Ibid.* pp. 327–335. With 6 figs. [4 refs.] [Culion Leper Colony, Philippine Is.]

Lara (C. B.). **The Plancha, or Infiltration, Method of treating Leprosy.**—*Ibid.* pp. 336–343. With 5 figs. [10 refs.] [Med. Section, Culion Leper Colony, Philippine Is.]

These three papers deal with the method of injecting chaulmoogra oil preparations directly into the leprous lesions. The authors mention that Rogers used solutions of the sodium salts and McDonald and Dean the ethyl esters by this method with resulting rapid shrinking of nodules. In the Philippines this plan has been used in addition to intramuscular injections in patients with a few persistent lesions. In the present trials a number of injections into the affected skin are given to produce a wheal not more than 1 centimetre in diameter, and the total amount injected at one sitting should not exceed twice the usual intramuscular dose of 4 or 5 cc. of the ethyl esters. C. B. Lara and C. Nicolas report on five early and one slightly more advanced case found among the children born at Culion—the only early cases seen there—treated with the esters of *Hydnocarpus wightiana* oil, with the remarkable result that four of them became negative bacteriologically in one to two months and the remaining one in five months' treatment, the quickest results they know of in the literature, so they conclude that the infiltration method is even more effective than the intramuscular or subcutaneous.

The second paper deals with intradermal injections at the seat of leprous lesions in place of Muir's subcutaneous ones in the chief types of the disease, namely, active macules, infiltrations and nodules, 100 of each being selected as showing fairly symmetrical lesions, so that one side could be kept as a control. The results were compared after ten months' treatment, and it was found that the macules responded best and the nodules least, none of the latter becoming bacteriologically negative. Twice as many of the treated lesions became clinically negative and nearly as large a proportion also bacteriologically negative as compared with the untreated control lesions. There was not much difference between the results obtained with iodized esters and with purified *H. wightiana* oil, and there was a steady increase in the number of negative cases in direct relation to the duration of treatment; with both the bacilli became granulated and gradually disappeared.

They conclude that the combined intramuscular and local injections were more effective than intramuscular alone. Photos of three cases illustrating the effects are given.

The third of this series of papers discusses the foregoing results and Lara's own experience. He concludes that the marked increase in the number of Culion lepers becoming negative during the last two years is due to the adoption of the infiltration method, and he thinks local reactions, the local destruction of the bacilli by the drug and the increased lipase leading to destruction of the lipoid material of the bacilli, as suggested by ROGERS, may all play a part in producing the good results noted.

L. R.

DE VERA (Bonifacio) & LARA (Casimiro B.). **Efficacy of Ethyl Chaulmoograte, Ethyl Hydnocarpate, and the Ethyl Esters of the Total Fatty Acids of** *Hydnocarpus Wightiana* **Oil.**—*Jl. Philippine Islands Med. Assoc.* 1929. Sept. Vol. 9. No. 9. pp. 307–317. [18 refs.] [Culion Leper Colony, Philippine Is.]

This paper records a trial in two series of 25 cases each of ethyl hydnocarpate prepared from *H. wightiana*, ethyl chaulmoograte made from *H. alcalae* oil of the Philippines, which contains mostly chaulmogric acid, and the mixed ethyl compounds of *H. wightiana* containing both preparations. The purified single esters products gave slightly better results than the mixed ones, which is attributed to their higher content in the active constituent, and the two esters were probably about equally active, contrary to the previous results of GREEN and HASSELTINE, who found ethyl chaulmoograte to be of little value.

L. R.

LABERNADIE (V.). Premiers essais sur l'action anti-lépreuse de l'huile d'*Hydnocarpus wightiana* irradiée ou additionnée d'ergostérine irradiée. [**Antileprous Action of Hydnocarpus Oil Irradiated or with Addition of Irradiated Ergosterol.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 759–762. [2 refs.]

In view of the variable results sometimes obtained by the use of *H. wightiana* oil in leprosy the author has tried specimens irradiated with a mercury quartz lamp and another sample to which 1 in 2,000 of ergosterol (irradiated vitamin D) was added, but owing to the very small amounts his observations were limited to the treatment of one case with each. He thinks the latter preparation was more effective in one case than the untreated oil.

L. R.

DE SANTOS (Irene) & WEST (Augustus P.). **Resins in the Seed Coats of Philippine Chaulmoogra Seeds** (*Hydnocarpus alcalae*).—*Philippine Jl. Sci.* 1929. Dec. Vol. 40. No. 4. pp. 485–491. With 2 figs. on 1 plate. [5 refs.]

SANTILLAN (Pura) & WEST (Augustus P.). **Chaulmoogryl Brom and Chlor Phenols.**—*Ibid.* pp. 493–497. [4 refs.]

COLE (Howard Irving). **The Constituents of** *Hydnocarpus wightiana* **Oil.**—*Ibid.* pp. 499–502. [6 refs.]

——. **Reduction of Irritation by Iodized Ethyl Esters of** *Hydnocarpus wightiana* **Oil.**—*Ibid.* pp. 503–509. With 2 plates. [10 refs.]

This is a further series of papers on the chemistry of chaulmoogra and other oils on which so much good work has been done in the Philippines.

(1) The Philippine *Hydnocarpus alcalae* is shown to contain 3·73 per cent. of resins in the seed coats. The tree and its seed are illustrated.

(2) Since the recent synthesis of some chaulmogryl substituted phenols four new chaulmogryl halogen phenols have been prepared, the highly technical chemistry of which is described. Esters were made rather easily but the reactions take place slowly.

(3) The fatty-acid with lower melting-point than hydnocarpic acid, namely, lauric acid, is reported to have been isolated from *H. wightiana* oil for the first time. A new optically active liquid fatty acid has also been obtained, but not yet in sufficient quantity to determine its composition.

(4) The addition of iodine to esters to lessen their irritant properties has for long been in use in the Philippines. The experiments now reported indicate that the most suitable preparation can be obtained by the following method. Fifteen litres of well-dried purified esters are heated in a 20-litre enamelled kettle at 140° C., and seven and five-tenths grams of U.S.P. resublimed iodine is added with stirring. The temperature rises to 150° C., at which it is maintained for 30 minutes with occasional stirring. After filtering into bottles they are sterilized for one hour at 150° C. They are used up to two years, but even after three they have not become markedly irritating.

L. R.

Peirier. Les *Caloncoba* à huile antilépreuse du Cameroun. [**Caloncoba Oil of the Cameroons in Leprosy.**]—*C.R. Acad. Sci.* 1929. Sept. 23. Vol. 189. No. 13. pp. 471–472.

The author states that the Flacourtiaceae, to which the Taraktogenos and Hydnocarpus belong, is represented in the African Cameroons by the Calonocoba, of which three species are now known, and he suggests the trial of preparations from their oil in leprosy.

L. R.

Canáan (T.). Die Jodkalibehandlung der Lepra. [**Treatment of Leprosy by Potassium Iodide.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. Dec. Vol. 33. No. 12. pp. 645–654. [9 refs.]

The author reports on a trial of potassium iodide in leprosy. He concludes that the remedy is by no means a harmless one, that in only quite a small percentage of cases is the drug beneficial, and that in a few patients better and quicker results are obtained than with other drugs, but it is still uncertain which forms and stages are most suitable for this form of treatment.

L. R.

Sézary (A.), Dérot (M.) & Guédé (M.). Sur le traitement de la lèpre par les sels d'or. [**Treatment of Leprosy by Gold Salts.**]—*Bull. Soc. Française Dermat. et Syph.* 1929. Nov. No. 8. pp. 1071–1074.

The use of gold salts in tuberculosis and the variable results obtained with this metal in leprosy led the writer to carry out a four months' trial in three cases of leprosy with allochrysine (thio-propanol sulfonate double gold and sodium) by intramuscular injection in 25 centigramme doses. In one case only very transitory amelioration was noted, in the other two intravenous injections of the drug produced acute exacerbations of the disease, so that the treatment was actually harmful in them.

L. R.

Aalsmeer (W. C.). Ervaringen bij de behandeling van Tuberculose en Lepra met Sanocrysine. [**Treatment of Tuberculosis and Leprosy with Sanocrysin.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1929. Sept. 1. Vol. 69. No. 9. pp. 889–893. [Dutch Indies Med. School, Soerabaja.]

Trials of sanocrysin in leprosy have after a few years led to the disappointing conclusion that no better results can be obtained than by other measures. The author had an opportunity to try sanocrysin in his Javanese patients, who proved to be very sensitive to the toxic action of the drug (erythema, albuminuria) as they are to the salts of other heavy metals (mercury). This made the use of larger doses (0·5–1 gm.) impossible, whilst smaller doses (100–200 mgm. once a week) had no noticeable effect.

In two cases of macular leprosy large doses caused an intoxication, after the healing of which the maculae were less pronounced, but the bacillus did not disappear from the nasal mucus, a result which might have been obtained just as well by protein shock treatment.

W. J. Bais.

Cochrane (Robt. G.). **The Action of Ephedrine in relieving Certain Painful Accompaniments of Leprosy and Lepra Reaction.**—*Lancet.* 1929. Sept. 14. pp. 551–552. [3 refs.]

This paper records four cases of leprosy which confirm Muir's advocacy of this drug orally to control very rapidly the painful reactions of nerve leprosy under treatment with Hydnocarpus oil preparations, but it did not control the temperature reactions unless combined with potassum antimony tartrate. Temporary relief is also afforded to joint and bone pains.

L. R.

de Vogel (W.). Les expériences du Professeur C. D. de Langen sur la réaction de Bargehr. [**De Langen's Trials of Bargehr's Reaction.**] —*Bull. Office Internat. d'Hyg. Publique.* 1929. Aug. Vol. 21. No. 8. pp. 1332–1337.

This interesting paper confirms the earlier observations of Bargehr (see this *Bulletin*, Vol. 24, p. 216) and also those of de Langen and de Vogel (*l.c.*, Vol. 26, p. 616) on the skin reactions following injections of sterilized emulsions of lepromata. Positive reactions occur in those who have never been in contact with lepers and in cases of spontaneous recovery from leprosy, but active cases give no reactions, and also some persons who have been long in contact with lepers, from whom they have contracted light and latent infections. The lepromatous emulsions are sterilized at 120° C., and kept in dry powdered form in sealed ampoules, but it is not easy to obtain a suitable antigen. A little of the antigen is applied to a scarified surface of the skin, lightly rubbed in for 5 minutes and allowed to dry for one hour. In from 1 to 7 days later a slightly raised erythematous patch appears and may persist up to 5 or 6 weeks. Tests in nine family groups are recorded, and the healthy reacted, but not the

leprous except in two cases who will be watched for any signs of the disease developing. Some very early cases gave negative reactions which were of diagnostic importance. An important field of investigation is opened up by the establishment of the value of this test.

L. R.

Gomes (J. M.). Desvio do complemento na lepra. [**Complement Fixation in Leprosy.**]—*Brasil-Medico.* 1929. Oct. 12. Vol. 43. No. 41. pp. 1223–1230. With 2 text figs. [Hyg. Inst., S. Paulo.]

The author carried out this test in nearly 200 cases of leprosy, or suspected leprosy, using the defatted *Streptothrix leproides* of Deycke as antigen. Brief notes are given of (1) Eight cases in which the clinical signs were very slight, "practically absent," but whose sera gave a high degree of fixation; (2) nine cases in an early stage; (3) seven contacts whose sera were positive but who remained free from all symptoms of leprosy; (4) seven other suspected cases. He gives in tabular form notes on the duration of the disease, the clinical form when definite, the results of examination of the nasal mucosa and the results of the serological test of 196 cases. [Where the findings are stated as percentages, the reviewer is unable to follow the author, as the total of positive serum reactions amounts to 136·31 per cent. and the negatives to 83·77 per cent.] The conclusions drawn are :—

(1) That this antigen is of value, not only in diagnosis of the disease, but in determining the degree of infection; (2) a positive result in contacts exhibiting no signs of leprosy indicates immunity; (3) when the positive falls and becomes negating, clinical signs begin to appear, unless the cases are recent and reacting well to treatment; (4) cases of leprosy giving a negative reaction are in general mild.

H. Harold Scott.

Muir (E.). **The Erythrocyte Sedimentation Test in Leprosy.**—*Indian Med. Gaz.* 1929. Sept. Vol. 64. No. 9. pp. 488–489. With 1 text fig.

This paper confirms the value of the sedimentation test as a guide to the treatment of leprosy as described recently by Isabel Kerr (see this *Bulletin*, Vol. 26, p. 1039). In carrying it out Muir advises taking 1·2 cc. of blood from the patient's vein into 0·3 cc. of 5 per cent. sodium citrate in a 2 cc. syringe, running the mixture into 300 millimetre pipettes graduated from 1 to 100, and standing them with their points in small holes in rubber corks. The top level of the erythrocytes is read off after 1½ and 2½ hours and the average of the two readings taken. Uninfected persons and the early stage give readings of 10 to 20, but in active dermal cases there is a fall of 30 to 60 points, and a well-marked increase occurs during a reaction, which is an indication for not giving another injection until it has fallen again. A gradual fall is of good prognostic value indicating the gradual elimination of the disease. The absence of any increase after large doses of iodides is also a favourable sign. Moreover, any drug which does not raise the sedimentation index is not likely to be of value in treatment.

L. R.

Shiga (K.). **Cultivation of the Lepra Bacillus. (First Report.)**—*Japan Med. World.* 1929. July 15. Vol. 9. No. 7. pp. 213–217.

——. Studien über die Kultur der Leprabacillen. I. Mitteilung. —*Acta Med. in Keijo.* 1929. Vol. 12. No. 2. pp. 72–80. With 7 figs. on 3 plates (2 coloured). [Microbiol. Inst., Univ., Keijo.] Also in *Zent. f. Bakt.* I. Abt. Orig. 1929. Nov. 30. Vol. 114. No. 7/8. pp. 511–518. With 2 text figs. & 3 coloured figs. on 1 plate.

In this very interesting paper Professor Shiga describes the apparently successful culture to a certain extent of the leprosy bacillus with the aid of Sumiyoshi's sulphuric acid method as used in his simple plan of cultivating the tubercle bacillus. Lepra nodules removed under sterile conditions were cut up and macerated in a mortar with 5 per cent. sulphuric acid and water, the material centrifuged, and the precipitate placed on potato medium, previously boiled in 4 per cent. glycerin-bouillon, which retains a moist surface for long. At the end of a month there was marked degeneration of the lepra bacilli, but after two months stained specimens showed an apparently new growth of masses of well-staining lepra bacilli, although no growth was visible, and subcultures of equally slow growth have been obtained to the third generation. In further attempts with slant agar media made in the same way as the potato one, but with a minimum of agar, small visible colonies were obtained. The cultures stain well by Ziehl's method and the bacilli show small meta-chromatic bodies within them.

L. R.

Aoki (T.) & Aoki (Y.). Ueber die Methode zur Unterscheidung lebender und toter Leprabazillen. [**Method of distinguishing Living from Dead Lepra Bacilli.**]—*Japanese Jl. Dermat. & Urol.* 1929. Oct.- Vol. 29. No. 10. pp. 64–65. [Dermat. Hosp., Nagasaki.]

The authors describe a method of staining which they think will distinguish between living and dead lepra bacilli.

The specimen is first stained with erythrosin 1·0, picric acid 0·15 and distilled water 100 parts for five minutes at 80°. After washing it is placed for one minute in caustic potash 5·0, absolute alcohol 30 and distilled water 70 parts, washed again and then stained for one minute in 1 per cent. caustic potash 1 part, saturated alcoholic solution of methylblue 15 parts and distilled water 100 parts. The living bacilli are said to be stained a bright red, dead ones a dark violet blue and intermediate ones a light reddish violet to a blue violet colour.

L. R.

Koike (Totaro). Beitrag zur Histogenese der Leprazellen. [**The Histogeny of Lepra Cells.**]—*Okayama-Igakkai-Zasshi* (*Zent. d. Okayama Med. Gesellsch.*). 1929. Apr. Vol. 41. No. 4. pp. 743–748. With 1 text fig. 15 refs.] [In Japanese. German summary pp. 749–750.]

This short paper deals with vital staining of lepra cells with a view to ascertaining their origin and nature; lithiumcarmine and trypanblue were chiefly used by injection into nodules, and were taken up by the lepra cells, but not by their vacuoles. This indicates a powerful phagocytic

action of the lepra cells such as is possessed by histioblasts, and it is suggested that the lepra cells are derived from those of the sebaceous and sweat glands of the affected skin.

L. R.

Molinelli (E. A.) & Royer (M.). La urobilina y bilirubina sanguínea y urinaria en la lepra. [**Urobilin and Bilirubin in the Blood and Urine in Leprosy.**]—*Semana Méd.* 1929. Dec. 19. Vol. 36. No. 51 (1875). pp. 1799–1801. [6 refs.] [Inst. of Infect. Diseases, & Physiol. Inst., Faculty of Med. Sciences, Buenos Aires.]

—— & ——. L'urobiline et la bilirubine du sang et de l'urine chez les lépreux.—*C.R. Soc. Biol.* 1929. Dec. 13. Vol. 102. No. 34. p. 873.

These estimations were carried out on 16 lepers of ages varying between 16 and 71 years, who had suffered from the disease from 3 to 23 years; four were of the nervous type, two of the nodular, and ten mixed. The results were usually negative. Urobilin was not found in the blood and the quantity in the urine was not above normal except in one case, a patient with diabetes. Blood bilirubin was normal in all except one of those with mixed leprosy in a severe form, the patient dying within a year; in this case the amount was doubled. Bilirubin and bile-salts were also absent except in the case noted above as suffering also with diabetes.

H. Harold Scott.

Wayson (N. E.), Badger (L. F.) & Dewar (Margaret M.). **Leprosy with Evidences of Abnormalities in Carbohydrate Metabolism.**—*Public Health Rep.* 1929. Dec. 6. Vol. 44. No. 49. pp. 2971–2983. With 3 charts in text. [10 refs.]

The authors report on the frequency of disturbances of carbohydrate metabolism found by a study of lepers in the Hawaii Kalihi hospital. Twenty-three per cent. of 175 lepers had glycosuria after fasting three hours or more, 80 per cent. showed abnormal glucose tolerance curves, and the basal blood sugar was commonly 20 per cent. higher than in controls.

L. R.

i. Markianos (J.). Développement rapide du virus filtrant de la lèpre des rats après inoculation aux jeunes rats. [**Rapid Development of Filtrable Virus of Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 758–759.

ii. ——. Filtration du virus de la lèpre des rats.—*Ibid.* June 12. Vol. 22. No. 6. pp. 410–411.

iii. ——. Le développement du virus filtrant avant sa transformation en bacille de la lèpre des rats.—*Ibid.* July 10. Vol. 22. No. 7. pp. 537–538.

i. In a short paper the author relates that rat leprosy virus after filtration through a 2L Chamberland bougie and injection into four young rats produced a rapid development of the disease with the appearance of acid-fast bacilli within 21 days, especially in the lymphatic glands. In an earlier paper (ii) he had shown that 3 to 9 months after inoculating similar filtrates into rats a few acid-fast bacilli could be

found in their glands. A month later (iii) he reported finding granular bacilli after 45 days and typical staining ones after 82 days in similarly infected rats.

L. R.

Markianos (J.). Le rôle des poux dans la transmission de la lèpre. [**The Rôle of Lice in the Transmission of Leprosy.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 633–635.

The author failed to transmit rat leprosy by the bites of lice fed on infected rats, or by oral administration of broken up lice infected by feeding on leprous rats, but on inoculating the last fluid into rats they became infected.

L. R.

da Matta (Alfredo Augusto). Prophylaxia da lepra. [**Prophylaxis of Leprosy.**]—*Brasil-Medico.* 1929. Sept. 14. Vol. 43. No. 37. pp. 1091–1096. [31 refs.]

After describing the bacillus, the attempts at its cultivation and the possible modes of dissemination, the author divides prophylactic measures into two main groups, aggressive and defensive. The former includes: compulsory notification of all cases and even suspected cases, and isolation or segregation in leprosaria, or colonies, with a hospital, or, where circumstances and the public health laws permit, domiciliary observation and treatment. The latter (defensive) includes: vigorous inspection of all those living in contact with lepers, dispensaries for periodic examination of suspects and treatment of early cases, a crèche for the children born of leprous mothers, and systematic campaign against flies and biting insects in the colonies and residences of lepers and their environment.

H. Harold Scott.

i. Tournier (E.). Le traitement de la lèpre par l'iode. [**Treatment of Leprosy by Iodide.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 762–764.

ii. Pinard (Marcel), Rabut, Girand & Abricosoff. Maladie de Hansen traitée par la malariathérapie. [**Leprosy treated by Malariatherapy.**] —*Bull. Soc. Francaise Dermat. et Syph.* 1929. July. No. 7. pp. 648–649.

iii. de Vera (Bonifacio). **Observations on Kahn-Positive Lepers treated with Neosalvarsan and subsequently with the Mixed Ethyl Esters of Hydnocarpus Wightiana Oil.**—*Jl. Philippine Islands Med. Assoc.* 1929. Sept. Vol. 9. No. 9. pp. 318–320. [1 ref.] [Med. Section, Culion Leper Colony, Philippine Is.]

iv. Macht (David I.). **Phytopharmacological Reactions of Blood Serum from Leprosy, Tuberculosis and Syphilis.**—*Proc. Soc. Experim. Biol. & Med.* 1929. Nov. Vol. 27. No. 2. pp. 150–152. [6 refs.] [Pharmacol. Research Lab., Hynson, Westcott & Dunning, Baltimore.]

v. Molinelli (E. A.) & Vaccarezza (A. J.). Le liquide céphalorachidien dans la lèpre. [**Cerebrospinal Fluid in Leprosy.**]—*C.R. Soc. Biol.* 1929. Dec. 13. Vol. 102. No. 34. pp. 87–873.

i. This is a report of a single nerve case treated with iodine orally with fairly rapid improvement in recently developed lesions and very slow improvement in older ones.

ii. The author reports one case of leprosy in which temporary amelioration followed an artificial benign tertian infection, but it was of very short duration.

iii. B. de Vera records a trial of neosalvarsan in 20 Kahn-positive lepers as a preliminary to antileprosy treatment, but found it did not increase the efficiency of the latter treatment.

iv. The author now reports that 22 specimens of leprosy sera sent to him showed a toxic effect on the growth of *Lupinus albus*, the average phytotoxic index being 47 per cent. (see this *Bulletin*, Vol. 26, p. 619, for previous paper).

v. The examination of the cerebro-spinal fluid of 69 lepers showed it to be normal and of no diagnostic or prognostic value.

L. R.

Eliseo Montaña. Estado actual de la lucha contra la lepra en Colombia. (La conferencia del profesor Burnet.)—*Repert. Med. y Cirug.* Bogota. 1929. Apr. Vol. 20. No. 4 (232). pp. 172–179.

da Matta (Alfredo Augusto). Prophylaxia da lepra.—*Sciencia Med.* 1929. Oct. Vol. 7. No. 10. pp. 497–508. [31 refs.]

Mohanty (L. N.). Two Cases of Leprosy successfully treated.—*Indian Med. Gaz.* 1929. Dec. Vol. 64. No. 12. pp. 694–695.

Triollet (R.). Sur un cas de lèpre autochtone constaté sur les Hauts-Plateaux constantinois.—*Arch. Inst. Pasteur d'Algérie.* 1928. Dec. Vol. 6. No. 4. pp. 492–493. [1 ref.]

SPRUE.

i. Mackie (F. P.), Fairley (N. H.) & Staff of the Haffkine Institute. **Progress Report on the Sprue Inquiry.**—*Far Eastern Assoc. Trop. Med. Trans. Seventh Congress, British India, 1927.* Vol. 2. pp. 248–257.

ii. Manson-Bahr (Philip), Maybury (L. M.) & Martin (P. H.). **On the Therapeutic Value of Blood Transfusion in Sprue Anaemia.**—*Ibid.* pp. 258–263. [1 ref.]

iii. Martin (P. H.). **Note on the Agglutinin Systems.**—*Ibid.* pp. 263–266. [10 refs.]

iv. Sokhey (S. S.). & Malandkar (M. A.). **Pancreatic Function in Sprue.**—*Ibid.* pp. 267–268.

v. —— & Gokhale (S. K.). **Liver Function in Sprue.**—*Ibid.* pp. 269–270.

i. All the information in this paper has appeared in the *Indian Journal of Medical Research* and has been adequately reviewed in this *Bulletin.*

ii. In a certain proportion of sprue cases, especially in those of long standing and in patients over fifty years of age, a pernicious anaemia may be the outstanding feature of the disease. In some cases a sudden liberation of haemolytic toxin takes place with the production of a rapidly progressive anaemia which may prove fatal in a few days. In eight fatal cases of sprue occurring in the Hospital for Tropical Diseases, London, during the last seven years, no less than five died of this pernicious anaemia. No therapeutic measures in sprue give such brilliant results as does blood transfusion. The protocols of five cases of extreme anaemia in sprue are cited in detail, the first having been transfused on March 29th, 1926. From a study of these cases it is concluded that the therapeutic value lies not so much in the replacement of destroyed blood corpuscles as in the stimulation of the haemopoietic system. In two instances more than one blood transfusion was necessary in order to obtain the desired result, while the impression is gained that the actual amount of blood injected is a secondary matter. In the 5th case cited brilliant results appear to have followed the injection of a comparatively small quantity—70 cc. In very severe cases of sprue anaemia with 400,000 red cells per cmm. of blood, the injection of amounts larger than 300 cc. should not be attempted. The stimulating effect of blood transfusion was seen in the first patient, who was able to surmount successfully an attack of lobar pneumonia during convalescence. In order to obtain the full benefit of blood transfusion the strictest dietetic measures must be carried out. Regeneration of the blood is greatly aided by the exhibition of liquor arsenicalis in the initial dose of 1 minim daily, gradually increased to 15 minims. In regard to the effect of the liver diet of Minot and Murphy in Addisonian anaemia the value of liver soup has long been recognized in sprue anaemia. All patients received 8 ounces of strong liver soup daily. A reaction with pyrexia following blood transfusion is more generally attended by beneficial results. The simplest technique of blood transfusion has given the best results and the citrated method alone has been used. Stress is laid on the importance of

direct testing for compatibility being performed with the donor's red blood corpuscles and the recipient's serum immediately prior to transfusion.

iii. In a note on the agglutinin system, P. H. Martin records that one of the recorded cases (No. 4) presented signs of auto-agglutination. The dependence of autoagglutination on low temperature was demonstrated. The serum was left in contact with the patient's own washed red cells in the coagulation tube and kept at low temperature. These factors appear to have destroyed some part of the agglutinin system. In the transfusion of this case a mild reaction of incompatibility occurred and mild haemoglobinuria resulted which lasted 24 hours.

iv. These workers employed the modern duodenal tube method to examine the pancreatic ferment in the duodenum in sprue and, at the same time, they analysed the fat content of the faeces for any information on the subject of pancreatic efficiency. Employing Saxon's wet method of fat analysis of faeces, they found that in only one out of a series of seventeen cases did neutral fat exceed 60 per cent. of the total fat content, whilst all cases except one showed normal splitting of fat. Quantitative estimation of diastase, trypsin and lipase in the duodenal contents of five cases showed these ferments present in normal amounts. They conclude that the pancreas functions normally in sprue. The total fat content of 14 out of a series of 17 sprue cases was high, ranging from 37·8 per cent. to 60·7 per cent. of total dry matter. The fat content of the faeces is connected with the consumption of milk and is found in diseases other than sprue when the patients are kept in bed and on a milk dietary. The high fat content of the faeces does not disclose anything peculiar to sprue.

v. Thirteen cases of clinical sprue were studied. The functional tests were the laevulose tolerance test, the Van den Bergh reaction, nitrogen partition of the blood and the bromsulphalein test of Rosenthal and White. Nitrogen partition did not reveal any inefficiency; the bromsulphalein dye tests yielded negative results, except in one patient who was almost moribund. They found an increase of serum bilirubin in 6 out of 13 cases as shown by the indirect Van den Bergh reaction. This increase of serum bilirubin they attribute to an increased destruction of erythrocytes. Seven cases gave abnormal laevulose tolerance curves. Probably inanition rather than a pathological condition of the liver is responsible for this.

P. H. Manson-Bahr.

Weiss (Charles) & Weiss (Dorothy Wilkes). **An Epidemiological Study of Tropical Sprue in Porto Rico.**—*Porto Rico Rev. of Public Health & Trop. Med.* 1929. Feb. Vol. 4. No. 8. pp. 333–343. With 1 map. [18 refs.] [School of Trop. Med., Univ. of Porto Rico, San Juan.]

From an examination of the records of the Bureau of Vital Statistics of the Porto Rico Department of Health, it was found that a total of 322 deaths had occurred from sprue between July, 1924, and December, 1927, or an average of 92 cases a year in a population of 1,400,000. The incidence of sprue was lowest in the mountainous interior of the Island; the rate in the principal municipalities varied from 0 to 27 per 100,000. In a study of sprue in relation to climatic conditions, altitude, rainfall, temperature and humidity, no absolute correlations were

discovered though, in a general way, the sprue incidence is greatest in those parts of the Island where the climate is hot and dry. Deaths from sprue are more frequent in the female sex, there being 170 females to 152 males. Old people supplied the grestest number with middle-aged persons next in order. Only 4 of the 322 deaths were in children from 1 to 5 years in age. In respect to race, there were four times as many sprue deaths amongst white as amongst coloured; the official proportion of white to coloured in the general population is given as 3–1. Native-born Porto-Ricans, Continental Americans and Europeans appear to be equally susceptible.

P. H. M-B.

VAN LOON (F. H. G.). **Tropical Neurasthenia and Sprue.**—*Jl. Trop. Med. & Hyg.* 1929. Mar. 1. Vol. 32. No. 5. pp. 59–63. [2 refs.]

In Batavia a great number of neurasthenic patients are treated. Out of a total of 2,068 (1,313 Europeans and Indo-Europeans, 641 Chinese and 114 Malays) during a period of three and a-half years, 766 were neurasthenics.

Patients suffering from tropical neuroses complain of all kinds of physical inconveniences. The author firmly believes that the tropical climate exerts a specific influence upon the nervous system, causing an insufficiency of the different parts of the vago-sympathetic nervous system resulting in asthma, itching, congestion and spastic constipation. Frequent mention has been made of the specific influence of the tropical climate on the digestive system and, though it is not intended to give point to the possible nervous origin of sprue, yet the neurological states in sprue require further investigation on the part of the neurologist.

Two of the author's own colleagues who had been suffering from sprue informed him of their conviction of the existence of a nervous element as the initial cause of sprue diarrhoea.

P. H. M-B.

VAN LOON (F. H. G.). Autonome insufficiëntie en spruw. [**Autonomic Insufficiency in Sprue.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. Mar. 30. 73rd Year. 1st Half. No. 13. pp. 1593–1599. [1 ref.]

Van Loon once more gives his views on tropical neurasthenia (see this *Bulletin*, Vol. 24, p. 824), in the clinical picture of which hypersecretion of various organs, e.g., diarrhoea, predominates. All these symptoms may be explained by over-irritation and subsequent insufficiency of the autonomic nervous system. The symptoms of tropical neurasthenia have a certain likeness to those of the early stages of sprue (watery diarrhoea, especially in the early morning, alternating with periods of constipation, dryness of the mouth, general irritability) and the author thinks that so far too little attention has been paid to the nervous complaints in sprue conditions. Sprue is not a disease of the natives of tropical countries, but of the European colonists, exposed to the neurasthenia promoting influences of tropical life. Many sprue patients are primarily psychically unbalanced individuals. From this and much other rather speculative argument the author concludes that the commonly accepted "constitutional weakness"

and " endocrine insufficiency " as causes of sprue are to be replaced by " digestive-autonomic breakdown and insufficiency " as sequels of tropical life. Upon this foundation the whole complex of sprue with its endocrine and toxic disturbances may develop.

W. J. Bais.

MARTIN (S. H.). **Relation of Sprue to Pernicious Anaemia. (Preliminary Report.)**—*China Med. Jl.* 1929. Feb. Vol. 43. No. 2. pp. 129–130.

Without any definite reasons, sprue is assumed to be a deficiency disease. In twelve cases of pseudo-sprue, uniform good results have been obtained by the use of liver extract and the free use of vitamin-rich food, especially tomatoes.

P. H. M-B.

MANSON-BAHR (P. H.). **Sprue Indigenous to Nyasaland.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. June 30. Vol. 22. No. 1. pp. 81–82. [2 refs.]

The author has searched for records of sprue from Central Africa. He could find only that TAUTE (1919) reported rather hazily that three sprue-like cases were noted amongst German troops in the last East African campaign; and that BEGG (1912) mentioned cases of sprue from the upper Congo, in his practice, but gave no adequate details. There are medical officers and a considerable European population in Central Africa. This negative evidence about sprue may therefore be of value in considering its etiology and, moreover, adds importance to this, the first proper record of a case of sprue from Central Africa.

The male patient, aet. 28 years, was born in South Africa, but had resided for the last 10 years in Nyasaland, mostly at Blantyre. He came under the author's medical care in March, 1927: for three months previously he had suffered from loss of weight and diarrhoea—5 or 6 large white frothy stools a day; he thought he had had a somewhat similar attack lasting two months in 1919. He was found to be passing large clay coloured stools, 12 oz. weight. Analysis gave total fat 29·2 per cent., combined fatty acids 8·4 per cent., neutral fat 4·4 per cent., free fatty acids 16·5 per cent. He had lost 28 lbs. weight; haemoglobin 85 per cent., red cells 4,500,000 per cmm.; fractional test meal showed absence of HCl and decrease of total acidity. Sigmoidoscopy revealed the changes [described first by the author] pathognomonic of early sprue—viz., pink oedematous mucous membrane, with white faeces in the gut lumen.

The author notes that, as in many cases of Indian sprue, this case showed no lesions of tongue or buccal mucosa. He comments on the possibility that conditions in Central Africa have arisen which predispose to sprue; or the virus imported by Indian immigrants has found suitable soil to flourish in, and infect the susceptible European.

H. M. Hanschell.

MANSON-BAHR (Philip). **On Non-Tropical or Indigenous Sprue.**—*Jl. Trop. Med. & Hyg.* 1929. May 1. Vol. 32. No. 9. pp. 118–119. [4 refs.]

The author points out that what is known and recognized as sprue is a symptom-complex. Apart from confirmatory or mostly accessory

means there is no test diagnostic of sprue alone, and abdominal tuberculosis, pancreatitis, Addisonian anaemia, may clinically closely resemble sprue. He insists that before diagnosing autochthonous English sprue he must find in the case the typical diarrhoea, anaemia, tongue and mouth lesions, and also the characteristic response to appropriate treatment. He notes that VAN DER SCHEER (1905) recorded a typical case of sprue who had never been out of Holland; MENSE (1913) diagnosed sprue in a case in Cassel, Germany; Hess THAYSEN (1925) reported a series of cases discovered in Denmark which he described as non-tropical sprue; but [Manson-Bahr points out], these cases had small stools and no anaemia, though other characters of stools, and mouth lesions, were typical. HOLST (1927) reported a case, with cramps and tetany, in Denmark.

The author now reports a case originating in England, which he had watched for 5 years (1920–25).

The woman, aet. 28 years, suffered (1919) from vomiting, diarrhoea, loss of flesh, after birth of third child. Stools were enormous, frothy, with sour odour. When seen 1920, tongue had become very sensitive especially to salt and pepper; aphthae on lower lips, fraenum linguae and buccal mucosa; amenorrhoea for over a year; abdomen doughy, distended; skin inelastic, dry; distinct diminution of liver dullness; general appearance pinched. Stools acid, large, pasty, mostly fatty acid and crystals. Fat content 40 per cent.; free acids 23·4 per cent.; neutral fats 2 per cent.; fatty acids in form of soap 15·3 per cent. Blood—red cells 3,500,000; haemoglobin 80 per cent.; colour index 1·1; white cells, 5,600. All tests for pancreatic inefficiency negative. The late Sir James CANTLIE concurred in diagnosis of sprue. Treatment—nursing, rest, milk dietary—followed by great improvement and return to former weight. Two years later after birth of fourth child relapse and recurrence of typical symptoms—recovery on same treatment. During next two years occasional diarrhoea with aphthous ulcers in mouth. In 1924 severe relapse, stools of typical sprue, supervention of severe pernicious anaemia, and great loss of weight. No response to milk and liver soup dietary, but good recovery under Cantlie's meat dietary. No symptoms for last four years.

[The author's authority in matters of sprue adds to the value of this record of a non-tropical case of sprue. He comments that other cases may be encountered in practice in England, and may shed light on the true aetiology of sprue.]

H. M. Hanschell.

HOLMES (William H.) & STARR (Paul). **A Nutritional Disturbance in Adults resembling Celiac Disease and Sprue. Emaciation, Anemia, Tetany, Chronic Diarrhea and Malabsorption of Fat.**—*Jl. Amer. Med. Assoc.* 1929. Mar. 23. Vol. 92. No. 12. pp. 975–980. With 9 text figs. [19 refs.] [Northwestern Univ. Med. School & Med. Service of Wesley Memorial Hosp., Chicago.]

In this group of clinical cases were found an extreme degree of emaciation, severe anaemia of the macrocytic type, low blood calcium with associated sensory and motor phenomena and fatty diarrhoea, all apparently arising from malabsorption of food. For want of a better term they might be classed as non-tropical sprue, but with equal justification as chronic digestive insufficiency, or as coeliac disease of adults. After a visit to San Juan, Porto Rico, to observe tropical sprue in various stages of development, the authors found many of the symptoms and signs in their cases were similar to those of tropical sprue. Five cases are reported.

P. H M-B.

i. Thaysen (T. E. Hess). **The "Coeliac Affection"—Idiopathic Steatorrhoeas**—*Lancet.* 1929. May 25. pp. 1086–1089. With 4 text figs. [34 refs.]

ii. Shackle (J. W.). **Sprue and Coeliac Disease.** [Correspondence.]—*Ibid.* June 8. p. 1224.

i. Since Herter in 1907 rediscovered the coeliac affection in children, later authors have paid attention only to cases in children, and have forgotten that Gee observed this disease also in patients returning from India and in adults who had never been abroad. Gee did not mention stomatitis, probably because in some cases of tropical sprue it is inconspicuous or absent. In Germany and in Holland and possibly also in England, there have been reported sprue-like diseases in individuals who have never been in the tropics.

The two diseases, Gee-Herter disease and sprue, are nearly related, if not identical. The patients are markedly emaciated, their muscles are flaccid and atrophic. Other outstanding symptoms are fatty diarrhoea, meteorism, changes in mucous membrane of tongue, achylia gastrica, poor appetite and anaemia. Tetany is a frequent complication. Enteritis is more frequent in tropical sprue than in coeliac disease, though in one out of four fatal cases of the latter slight subchronic enteritis was demonstrated. Schaap states that the tongue in Gee-Herter disease may show similar changes to those of sprue. Thaysen believes that there are two more signs common to sprue and Gee-Herter disease, the low blood sugar curve and the abnormal basal metabolism. A low blood sugar curve—that is, with a rise of 40 mgm. per cent. or less—is considerably more frequent in sprue and Gee-Herter disease than in normal people. This abnormality subsides with recovery.

In a table are given details of non-tropical sprue and of Gee-Herter disease in children. Of 11 cases of non-tropical sprue, 4 developed before the age of 20 years and 1 in a child of 11. Among 6 cases of Gee-Herter disease 1 began at the age of 13 years and 2 at the age of 10 years. In sprue and in Gee-Herter disease, change to another climate promotes a cure. Thaysen would group sprue, non-tropical sprue and Gee-Herter disease together as "the idiopathic steatorrhoeas" in order to differentiate them from pancreatogenous, acholic, and possibly also enterogenous fatty diarrhoea.

ii. Dr. Shackle points out that in conjunction with Dr. A. C. Hampson (Guy's Hospital Reports, April, 1924) he demonstrated by the graphic method that the blood in sprue shows the same megalocytic changes as in Addison's anaemia. In two cases of coeliac disease no corresponding blood changes were observed.

P. H. M-B.

Beijnen (G. J. W. Koolemans). Een geval van tropische spruw. [**A Case of Tropical Sprue.**]—*Nederl. Tijdschr. v. Geneesk.* 1929. June 22. 73rd Year. 1st Half. No. 25. pp. 2925–2936.

This clinical lecture gives the case of a European woman of 41, who resided in the tropics for 13 years and during that time apparently suffered from bacillary as well as from amoebic dysentery. Afterwards she remained inclined to attacks of diarrhoea without any particular reason; the use of fish was sure to produce severe diarrhoea, sometimes with

vomiting. After her return to Europe, 3 years ago, the condition temporarily improved, but soon a relapse occurred which slowly led to the fully developed picture of sprue.

The differential diagnosis is made from pernicious anaemia (atypical blood picture, emaciation, absence of symptoms of the nervous system, presence of hydrochloric acid in the stomach contents) and from pancreatic disease (normal blood sugar value, absence of alimentary glycosuria), and the separate symptoms of sprue are fully discussed as well as the theories concerning its etiology.

Apparently, especially from the therapeutical direction, the author considers overburdening of the intestinal tract with carbohydrates as the principal cause of the disease. But for a great restriction of carbohydrates, no special diet is recommended. Raw food is better borne than so called light digestible foodstuffs. Rest, if possible in bed, is of great importance in all cases of any severity. The blood producing organs may be stimulated by injections with some arsenical preparation.

A long and systematic treatment is required to obtain a complete cure, which, however, is reached in most cases in 1–2 years. The gradual diminution of the fat content of the faeces is taken as a guide in allowing more carbohydrates in the diet.

W. J. Bais.

SCHERER (Else). Ein Fall von einheimischer Sprue. [**Case of Indigenous Sprue.**]—*Klin. Woch.* 1929. Aug. 27. Vol. 8. No. 35. pp. 1625–1626. [2 refs.]

The patient, a lady of 45 years of age, had during the years 1924–1928, undergone a series of gynaecological operations and had suffered considerably from bronchitic symptoms. During the latter part of 1928 sprue symptoms declared themselves, the diagnosis being established by the large frothy voluminous stools, severe anaemia of hyperchromatic character, well-marked glossitis and stomatitis, diminished acidity of the gastric juice, high degree of meteorism and the appearance of tetany with diminution of the blood calcium content. The cachexia was extreme and there was a high degree of wasting. Great improvement resulted from an albuminous dietary with minced raw beef, cooked liver, two teaspoonsful of Hepatopson (Promonta), plenty of fruit and 20 drops of dilute hydrochloric acid daily. The tetanic symptoms disappeared after liberal dosage with Parathormone (Lilly) and Collip's extract of parathyroid.

The author believes that this was a case of non-tropical sprue comparable to those described by THAYSEN.

P. H. M-B.

MACKIE (F. P.) & CHITRE (G. D.). **Yeasts and Sprue.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1928. Aug. Memoir No. 11. 39 pp. With 8 plates. [34 refs.]

The authors isolated 252 strains of yeast-like fungi from faeces from cases of typical sprue, other intestinal diseases, and healthy men and animals. They studied these strains as regards fermentation powers, type of growth in fluid media and on gelatin, appearance of giant colonies, and morphology on solid media.

They found that the strains could be separated into two main classes, A and K. Class A are all maltose fermenters, and usually also ferment glucose, laevulose and galactose, and are of the type of *Monilia psilosis*

Ashford. Class K are all non-fermentors of maltose and are of the type of *Monilia kruzei* Castellani. The yeast-like fungi which are commonly regarded as pathogenic are of the A type; and saprophytic or non-pathogenic ones of the K type. The fermentation powers of these yeasts were found to be quite constant with respect to maltose, but to vary in the majority of the strains as regards other sugars when tested after long sub-culturing. Usually, after repeated sub-culturing, there was a decrease in fermentative power, which could be restored, wholly or in part, by passage through experimental animals. Another small class, M, could be separated, and included strains not fermenting maltose and never forming any mycelium, and thus being of the *Cryptococcus* type. In general, the A and K classes could be differentiated by fermentation powers, growth in fluid media, growth on gelatin and on solid Sabouraud medium, and the appearance of the giant colonies. None of the strains liquefied gelatin, and none of those tested had haemolytic properties. Cultures of yeasts or other organisms were not obtained from blood-cultures from a number of cases of typical sprue.

The *M. psilosis* type of yeasts was found in 40 per cent. of cases of sprue, and in an equal percentage of cases of other intestinal diseases, and healthy men and animals. The *M. kruzei* type of yeasts was present in about 50 per cent. of cases of sprue and other diseases, and in a smaller percentage of healthy men and animals. The distribution of the different types of yeasts is similar in sprue and other diseases, and no type is particularly frequent in either a diseased or healthy condition. Consequently, there is no evidence that any yeast has a causative relation to sprue.

P. Tate.

Weiss (Charles) & Landrón (Francisco). **Immunological Investigations on Tropical Sprue in Porto Rico.**—*Amer. Jl. Trop. Med.* 1929. Mar. Vol. 9. No. 2. pp. 83–96. [22 refs.] [School of Trop. Med., Univ. of Porto Rico, & Presbyterian Hosp., San Juan, Porto Rico.]

Specimens of whole blood from a series of 20 sprue patients were compared with specimens from 20 miscellaneous hospital cases in their ability to inhibit the growth of various Monilia, but no evidence of a specific activity of the blood in sprue patients towards Monilia could be obtained.

Endotoxins were prepared from *M. psilosis*, *M. albicans* and a cryptococcus from cutaneous blastomycosis and used in skin tests on a series of 22 undoubted cases of sprue and 26 patients suffering from various medical and surgical disorders. While a majority of the sprue cases gave positive reactions to the endotoxins of *M. psilosis*, a larger percentage reacted to the toxins of *M. albicans* and the cryptococcus. In the controls about one-third reacted to all three toxins.

Attempts to transmit sprue to three human subjects and to three ring-tailed monkeys by rubbing into their tongues scrapings obtained from the inflamed tongue of a sprue patient, were unsuccessful. Attempts at producing the disease by injecting Monilia into the skin of human volunteers and into the tongue and peritoneum of monkeys were similarly negative.

P. H. M-B.

FAIRLEY (N. Hamilton) & JASUDASAN (F.). **An Investigation of the Value of the Complement Reaction in Sprue utilizing** *Monilia psilosis* (*Ashfordi*) **as Antigen.**—*Indian Jl. Med. Res.* 1929. Apr. Vol. 16. No. 4. pp. 861–869. [22 refs.] [Haffkine Inst., Bombay.]

Rabbits inoculated intravenously with saline suspensions of *Monilia psilosis* yield sera of high grade titre when tested *in vitro* by means of the complement fixation reaction using aqueous extracts of the Monilia as antigen. The sera of 12 out of 14 inoculated rabbits fixed from 15–24 minimum haemolytic doses of complement some 10–32 days after the first injection, while the sera of the other two fixed 5 minimum haemolytic doses. Identical antigens when tested against human sera derived from sprue patients failed to show positive reactions in 15 out of 17 cases tested. No confirmation of the claims of ASHFORD, MARTINEZ and MICHEL was therefore forthcoming. P. H. M-B.

THAYSEN (T. E. Hess) & NORGAARD (A.). **The Regulation of Blood Sugar in Idiopathic Steatorrhea (Sprue and Gee-Herter's Disease). I. The Low Blood Sugar Curve.**—*Arch. Intern. Med.* 1929. July. Vol. 44. No. 1. pp. 17–28. With 6 charts. [18 refs.] [St. Elizabeth Hosp., Copenhagen.]

The low blood-sugar curve is most frequently present in the idiopathic steatorrhoeas. The blood sugar was determined by the method of Hagedorn and Norman-Jensen; the amount of dextrose ingested was usually 60 gm. Blood was withdrawn every ten minutes, as frequent estimations are necessary in determining the rise of the curve. As is well-known, the blood sugar curve varies considerably in normal persons and this variation follows the ordinary curve of error. According to their calculations the low curve defined as a curve with a rise of 40 mgm. per 100 cc. or less is encountered in 5 per cent. of normal persons.

In the group of diseases which the authors designate "idiopathic steatorrhoeas" they include (1) tropical sprue, (2) non-tropical sprue, and (3) "the coeliac affections" of GEE (1888), later described by HERTER as "intestinal infantilism." The blood sugar curve is low in all these diseases as the authors of this paper were the first to point out. Whereas one may expect a low curve in about 5 per cent. of normal persons, they found such a curve in 50 per cent. of sufferers from idiopathic steatorrhoea.

The authors attach considerable importance to the rise of the blood sugar curve as a diagnostic aid in the classification of the diseases coming under the heading of chronic steatorrhoea. In the pancreatogenic form a diabetic curve occurs as the result of a lowered function of the pancreatic islands. In alcholic steatorrhoea the curve is either normal, or shows a marked rise followed by a fall to hypoglycemic values.

Tetany is a rather frequent phenomenon in idiopathic steatorrhoea as was demonstrated in six of the thirteen patients. P. H. M-B.

KASSIRSKY (J. A.). Ueber den Grundumsatz bei der Sprue. [**Basal Metabolism in Sprue.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1929. May. Vol. 33. No. 5. pp. 283–287.

Kassirsky's investigations have led him to believe that in sprue we are dealing, not with a localized affection of the intestinal tract, but

with some general disturbance of metabolism. Nothing accurate is so far known about basal metabolism in this disease.

The widespread pathological changes, especially those of the blood-forming organs, the marked hyperchromic anaemia, the changes in the viscera, achylia in combination with the most severe enteritis, the exhaustion in association with acidosis, all contribute towards great alterations in the general rate of metabolism. In general, there is a rise of the metabolic rate. The Knipping method of estimating the rate has been employed. There were, however, three exceptional cases in which a fall was registered. Two of these were in the convalescent state, while the third was very mild.

It is noteworthy that peculiarly chronic cases with severe anaemia and emaciation tend to show a rise in the basal metabolic rate. In the first place there is a great reduction in the absorption of nutritious material owing to the disturbance of digestive processes in the intestinal canal. In true starvation it has been proved that a fall in the rate of metabolism takes place. In severe cases of sprue emaciation is a constant factor, and there is an intensive destruction of albumen. The second factor which must influence the metabolic rate in sprue is the anaemia which is one of the cardinal symptoms of the disease. It is generally agreed that a rise of metabolism accompanies anaemia, whether hyperchromatic or hypochromatic. It is probably an over compensation of the organism which leads to an excess of oxygen absorption—as is seen after a severe haemorrhage.

Lastly, the influence of " acidosis " on the metabolic rate is discussed and the conclusion reached is that no importance can be attached to this condition.

For comparison this investigator has studied five cases of uncomplicated enteritis and three cases of pellagra with sprue-like phenomena without finding any disturbance of basal metabolism.

The table accompanying this article should be studied.

P. H. M-B.

ASHFORD (Bailey K.). **Mycology of Intestinal Canal in Porto Rico and its Relation to Tropical Sprue.**—*Jl. Amer. Med. Assoc.* 1929. Sept. 7. Vol. 93. No. 10. pp. 762–765. With 4 text figs. [1 ref.]

——. La mycologie du canal intestinal à Porto-Rico et ses relations avec la sprue tropicale.—*Bull. Soc. Path. Exot.* 1929. Feb. 13. Vol. 22. No. 2. pp. 58–60.

The object of this study (which has been continued since November, 1924) has been to classify the common fungi of the intestinal tract in Porto Rico and to establish the relative frequency of *Monilia psilosis* in the normal bowel and in that of sufferers from tropical sprue. Data have been assembled from the culture of 872 cases, 280 of whom had clinical sprue, 288 were sufferers from nutritional unbalance, 126 from various other diseases, whilst 178 were healthy boys from a charity school in San Juan. Exclusive of the latter group, 1,201 cultures were made from the faeces of 694 sick persons. Of these 420, or 36·9 per cent., were negative for fungi. A more intensive study was made of all fungi recovered in the last 184 cases of this series. Of these 52·7 per cent. were positive for *Monilia psilosis*. The total number of specimens of faeces grown in culture was 210 ; of these 17·6 per cent.

were negative. With the exception of unclassifiable fungi, 95·3 per cent. of the fungi in the intestinal canal in Porto Rico fall into five genera and about one dozen species. The author's present view as to the causation of sprue is stated as an infection grafted onto the syndrome of nutritional unbalance. Exhaustion, both physical and mental, are predisposing factors, for sprue is pre-eminently an exhaustion process. Into the sweet, fermenting acid bowel is sown the omnipresent *Monilia psilosis* and there in its preferred medium it colonizes, instead of passing out, as in health it seems to do, without effecting any serious foothold. The following conclusions may be reached :—

" 1. *Monilia psilosis* is a pathogen ; if it is not, then neither is *Monilia albicans*.

" 2. *Monilia psilosis* abounds in the intestinal canal of the patient with sprue until, in the cachectic forms of the disease, the reaction of the bowel becomes radically changed, or the intake of improper food is checked, often too late for digestive glands that have finally become impotent.

" 3. *Monilia psilosis* tends to pass from one to another of the same family who eat the same food and are suffering from the same food unbalance.

" 4. Sprue relapses in northern countries, where it is practically unknown, after long periods of a corrected dietary, or, indeed, may even develop for the first time months or years after the subject has left the tropics.

" 5. Even in certain tropical countries of large extent, where probably a number of cases of a similar syndrome of food unbalance exists, sprue seems to be at least a rare disease."

P. H. M-B.

Weiss (Charles), Landron (Francisco), Costa-Mandry (Oscar) & Wilkes-Weiss (Dorothy). **Summary of Investigations on the Etiology of Tropical Sprue in Porto Rico.**—*Ann. Intern. Med.* Ann Arbor. 1929. May. Vol 2. No. 11. pp. 1198–1208. With 1 map. [15 refs.]

All the results recorded in this paper have already been reviewed in this *Bulletin*.

P. H. M-B.

REVIEWS AND NOTICES.

COCHRANE (Robert G.) [M.D., Ch.B., M.R.C.P., D.T.M. & H., Secretary, British Empire Leprosy Relief Association, Hon. Medical Adviser, Mission to Lepers]. **Leprosy: Symptoms, Diagnosis, Treatment and Prevention.** With Foreword by Major-General Sir Leonard Rogers, M.D.,F.R. C.P., F.R.C.S., F.R.S., I.M.S. (retd.). 2nd (Revised) Edition.—68 pp. British Empire Leprosy Relief Association, 29 Dorset Square, London, N.W. 1. [2s.]

Dr. Robert Cochrane is the Secretary to the British Empire Leprosy Relief Association. His brochure, therefore, bears the stamp of authority.

The present edition, revised and enlarged, sets out in concise form the results of a close study and a practical experience of the disease in various oriental endemic centres. The importance of such a handbook is emphasized by Sir Leonard Rogers, who very wisely states in the preface that " it is easy to do more harm than good by over-active treatment, so clear guidance in the use of new remedies is required by the numerous men and women now engaged in the great effort to reduce and eventually eradicate leprosy from our scattered tropical and sub-tropical possessions."

The first portion of the work (pp. 5–25), dealing as it does with symptomatology, diagnosis, and prognosis, is probably too much abridged to be of practical assistance to anyone unacquainted with the disease ; it should be regarded rather as an *aide-memoire* to leprologists of experience.

In the second and major section (pp. 26–59) the author discusses in considerable detail some of the modern therapeutic measures employed, with particular reference to the exhibition of (1) hydnocarpus oil and its derivatives, (2) iodides, and (3) protein injections. The general treatment of the patient is very briefly touched upon, and " Fresh Air " is dealt with in five lines. It seems unfortunate that the principles taught by BEAUPERTHUY and practised by him with such success in the West Indies about seventy years ago should receive such scant attention from modern writers on leprosy.

As a practical guide, the book is somewhat marred by a tendency to looseness of expression and by other evidences of haste in its preparation. For example, on page 61, a reader might understand the phrase " after 1 per cent. hours," but he would have difficulty with the interpretation of the following : " Medicinal reaction in leprosy is equivalent to a dose of an autogenous vaccine, and by the S.I. [Sedimentation Index] we can gauge to a nicety the amount of vaccine generated by a drug like Potass : Iodide." On page 46, SHARP'S method of producing protein shock is " to inject 0·5 cc. of sterile tinned Milkmaid brand or Ideal milk diluted with nine parts of distilled water." How can the beginner be certain whether he is to inject 0·5 or 5·0 cc. of the diluted milk ?

The above are only a few examples of the errors of composition which call for a further revision of the work, and they are specifically quoted in the hope that Dr. Cochrane will take an early opportunity of removing the weak points from an otherwise useful and authoritative brochure.

J. Anderson.